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AIR POLLUTION ASPECTS OF EMISSION SOURCES: SURFACE COATINGS-THEIR PRODUCTION AND USE

A BIBLIOGRAPHY WITH ABSTRACTS

ENVIRONMENTAL PROTECTION AGENCY

MARCH 1974

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Air Pollution Aspects of Emission Sources:

SURFACE COATINGS— THEIR PRODUCTION AND USE

A Bibliography with Abstracts

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The Air Pollution Technical Information Center (APTIC) of the Office of Air Quality Planning and Standards prepared, selected, and complied the approximately 235 abstracts in this bibliography. The entries are grouped into the following subject categories: emission sources; control methods; measurement methods; air quality measurements; atmospheric interactions; basic science and technology; effects-human health; effects materials; effects-economic; standards and criteria; legal and administrative; social aspects and general. The subject and author indexes refer to the abstracts by category letter and accession number. The author index lists all authors individually; primary authorship is indicated by an asterisk.

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Air Pollution Technical Information Center

ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Water Programs
Office of Air Quality Planning and Standards
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AIR POLLUTION ASPECTS OF EMISSION SOURCES: SURFACE COATINGS– THEIR PRODUCTION AND USE A BIBLIOGRAPHY WITH ABSTRACTS

INTRODUCTION

The Air Pollution Technical Information Center (APTIC) of the Office of Air Quality Planning and Standards prepared, selected, and compiled the approximately 235 abstracts in this bibliography. The abstracts are arranged within two categories listed in the Contents. The abstracted documents are thought to be representative of available literature, and no claim is made to all-inclusiveness.

The subject and author indexes refer to the abstracts by category letter and accession number. The author index lists all authors individually; primary authorship is indicated by an asterisk. Generally, higher accession numbers have been assigned to more recent documents.

Current information on this subject and many others related to air pollution may be found in APTIC's monthly abstract bulletin.*

All of the documents abstracted by APTIC are currently on file at the Air Pollution Technical Information Center, Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, North Carolina 27711. Readers outside of the U.S. Environmental Protection Agency may seek the documents directly from publishers, from authors, or from libraries.

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*"Air Pollution Abstracts", Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Subscription price: $27.00 per year; $6.75 additional for foreign mailing. (More than 6300 abstracts, subject and author indexes are included in each issue, plus two separate indexes.)

A. EMISSION SOURCES

00746

R. Piper

THE HAZARDS OF PAINTING AND VARNISHING 1965. Brit. J. Ind. Med. (London) 22(4):247-266, Oct. 1965.

A review of paint hazards is made, giving brief descriptions of methods of application in use in 1965, of paint usage according to resin base, and of paint ingredients. The most interesting and complex of these are the resin bases, which have much in common with plastics. Reference is made to some of the many minor ingredients. The problem of keeping abreast of the possible toxic effects, so that paint manufacturers and their customers may be warned and protected is emphasized. (Author's abstract)

00904

T. Karoly

DANGER OF FIRE, EXPLOSION AND HEALTH-DETERIORATION WITH VARNISHING AND PAINTING - PART I. A Lakkazas-Festes Tuz-, Robbanas- es Egeszsegveszelyei. Gepgyartes Technologia (Budapest), 6(7):311-315, July 1966.

The highest permissible values, in volume-%, are given for a number of poisonous vapors found in the dyestuffs industry. Dust from pigments and loaders, and vapors from solvents and extenders are deleterious to an extent dependent on the length of exposure and poisonous nature of each material. The danger arising from deterioration of these substances is discussed and methods for prevention of the accumulation of critical amounts of the vapors in the working area are outlined.

03764

03864 P. S. Tow, E. J. Vincent, J. A. Verssen, R. L. Weimer, and R. M. Ingels

A SURVEY OF ORGANIC SOLVENT VAPOR EMISSIONS IN LOS ANGELES COUNTY (FINAL REPT.). Los Angeles County Air Pollution Control Board, Calif. Sept. 1, 1959. 67 pp.

In 1958, a program of comprehensive surveys of solvent vendors and industries using organic solvents, diluents or thinners was accelerated by the Los Angeles County Air Pollution Control District. The information obtained from the surveys has been evaluated to estimate the nature and quantity of organic companies were surveyed. On the assumption that all organic solvents purchased and used as solvents are eventually vaporized, a review and analysis of the survey data shows that the daily emissions of organic vapors from organic solvent usage amount to 430 tons. This total consists of 300 tons per day of aliphatic and aromatic hydrocarbons and 130 tons per day of other organic materials, principally ketones, alcohols, esters and chlorinated hydrocarbons. Estimates of emissions from the various types of operations utilizing solvents were made from surveys of users, solvent vendors and vendors of protective coatings. These are tabulated as well as the solvent emissions from the individually surveyed categories of industry. No one industry appears to contribute more than 8% of the 430-ton-per-day total. Comparison of data on emissions from organic solvent usage with organic emissions from other sources indicates that organic solvent vapor emissions account for almost 30% of the total organic emissions from all sources into the Los Angeles atmosphere. Solvent usage contributes about 20% of all of the aliphatic and aromatic hydrocarbon vapors emitted and about 70% of other emissions of organic origin. Application of oil-based surface coatings in all industrial, commercial and domestic activities was found to account for about 55% of the total of emissions from organic solvent usage. Other principal uses of solvents or sources of emissions are encountered in metal degreasing, dry cleaning and in the use of solvent -containing materials such as inks, pharmaceuticals and adhesives. (Author summary modified)

04234

J. V. Pustinger, Jr., F. N. Hodgson, and W. D. Ross

IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS. Monsanto Research Corp., Dayton, Ohio. (Rept. No. AMRL-TR-66-53.) June 1966. 210 pp. CFSTI: AD 642054

Fifty-five candidate materials for space cabin construction were stored for 30, 60 and 90 day periods at 23-25 C, and 20-40% R. H. in environments of air at a pressure of one atmosphere and oxygen at 5 psia. The composition of the gas-off products was determined by mass spectrometry and gas chromatography. Considerable amounts of gas-off products were detected from candidate materials prepared immediately prior to testing, e.g., coatings, paints, and adhesives. Very little, if any, gas-off products were evolved from materials submitted as fabricated sections, e.g., polycarbonates, polyvinylfluorides, and nylon based material. In general, the major gas-off products were solvents, plasticizers, and monomers. Some coatings desorbed considerable amounts of carbon monoxide. Others gave off relatively large quantities of trimethyl silanol and low molecular weight methyl siloxane polymers. Although slight differences in relative amounts of alcohols and aldehydes were observed in some gas-off atmospheres, no large changes in atmospheric composition were observed that could be attributed to increased oxidation when materials were exposed at 23-25 C to oxygen at 5 psia. Quantitative analyses of the gas-off products were influenced by: uniformity of sample lots, sample homogeneity, freshness of sample, free surface area, adsorptive characteristics of the encapsulating chamber, method of sampling the gaseous atmosphere, and method of analysis. Additional analyses were performed on desorbates from four carbon canisters from space cabin simulators and the hydrolysis products of MCS 198. (Author abstract)

08521

Walton, T. R.

DEVELOPMENT OF INTERIOR PAINTS FOR NUCLEAR SUBMARINES. In: Status of Chemical Research in Atmosphere Purification and Control on Nuclear-Powered Submarines (Fifth Annual Progress Lab., Washington, D. C., NRL-6491, p. 27-32, Jan. 11, 1967. 5 refs. CFSTI, DDC: AD 648505

One development of a high quality paint that could be used while on patrol duty is described. Two fundamental requirements of the new paint were: (a) that it release little or no volatile organic compounds into the submarines atmosphere during or after application and (b) that it be self-extinguishing on its fire-retardancy program. There were other general requirements of the paint. Four paint systems have been studied and are separately discussed. They are: (1) a latex paint containing a chlorinated additive and antimony oxide, (2) a paint based on a vinyl chloride/acrylic copolymer emulsion and antimony oxide, (3) a paint based on a convertible water-soluble chlorinated alkyd, and antimony oxide, and (4) a paint based on a water soluble linseed oil derivative and containing a chlorinated additive and antimony oxide. The abilities of each system to meet the given requirements are evaluated.

08553

Coffman, Q. H.

SOUTHERN CALIFORNIA AEROSPACE INDUSTRY'S PROGRAM TO CONTROL SMOG PRODUCED BY CHEMICAL MILLING MASKANTS AND SHOP PROTECTIVE COATINGS. S.A.E. (Soc. Automovite Engrs.), Preprint 670816, 10p., 1967. (Presented at the Aeronautic & Space Engineering & Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967.)

The materials, test criteria results, and conclusions for chemical milling maskants and hand-peelable shop protective coatings which comply with Rule 66 of the Los Angeles County Air Pollution Control District (APCD), and are used by the aerospace industry in Southern California are discussed. The maskants were evaluated to determine the material best suited under Rule 66 to perform chemical milling, and the shop protective coatings were evaluated to determine the material best suited for protecting metal surfaces during fabrication, adhesive bonding, and assembly operations. (Authors abstract, modified)

08557

George, J. C. and G. R. Morris

AVAILABILITY AND EVALUATION OF NONPHOTOCHEMICALLY REACTIVE PRIMERS AND TOPCOATS FOR AEROSPACE APPLICATIONS. S.A.E. (Soc. Automotive Engrs.), Preprint 670814, 7p., 1967. (Presented at the Aeronautic & Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967.)

New coatings with low smog producing potential have been and are continuing to be evaluated for use in the aerospace industry. These new coatings have been proved in laboratory and shop testing to be equal in quality to the conventional coatings they are replacing. Environmental exposure tests to date are satisfactory and are continuing. However, difficulty has been encountered in obtaining consistent quality in large production batches. Some of the new coatings contain solvents that are slightly more toxic. Also, some of the modified coatings have lower flash points. These new materials, which include both proprietary and military coatings, appear to be readily available. Coating costs of the new materials generally are higher, but vary from a reduction of approximately 7 percent to an increase of 35 percent. (Authors abstract)

09028

G. G. Esposito

QUANTITATIVE MEASURE OF PHOTOCHEMICALLY REACTIVE AROMATIC HYDROCARBONS IN ENAMELS AND THINNERS. (INTERIM REPORT.) Army Coating and Chemical Lab., Aberdeen Proving Ground, Md., Contract AMCMS-5025.11.29500, Proj. 1T024401A329, CCL-241, 12p., Dec. 1967. 5 refs. Also: J. Paint Technol., 40(520): 214-221, May 1968. 9 refs. CFSTI, DDC: AD 663813

Recently enacted air pollution abatement laws regulate the amount of photochemically reactive solvents at can be used in paint products. Aromatic solvents possess the strongest solvency of the hydrocarbon types, but their use in paint must now be restricted in order to comply with air contamination laws. This report describes a suitable gas chromatographic procedure for the determination of toluene, ethyl benzene and total aromatics in enamels and thinners. The solvent is isolated by vacuum distillation. High boiling and low boiling internal standards are added and the analysis is conducted on six and eighteen foot columns containing N,N-Bis(2-cyanoethyl) formamide as the liquid. (Author's abstract)

09238

Mader, P. P., and E. S. Mills

CONTAMINANT CONTROL IN SPACE CABINS: APPROACH AND RESULTS. Aerospace Med., 38(8):822-825, Aug. 1967, 4 refs.

The systematic screening of materials and supplies intended for use inside space cabins is described. Materials were screened on the basis of their outgassing properties at 120 deg F. for 72 hrs. in an apparatus consisting of a closed 72-1. Pyrex flask containing 50 percent 02 and 50 percent nitrogen and equipped with several inlet tubes through which gas samples were withdrawn for gas chromatographic and infrared analysis. Pressure within the flasks was adjusted to 0.5 atm. The test temperature of 120 deg F. was selected as the highest level at which the chromatograms and infrared spectra were still representative of the actual components in the gaseous system. When paints and finishes were tested, a water-based methacrylate paint was found to release the smallest amounts of outgassing products, while epoxy paint and polyvinyl acetate released considerably larger volumes of outgassing products. A sound dampener was discarded when tests indicated the release of substantial amounts of formaldehyde. Glasswool and asbestos ribbons released large amounts of organic compounds, although they had been previously flash-fired at 700 deg F. One insulating material was selected after 6 were screened. Trichlorethylene, used as a space cabin cleaner, should not be used for a final cleaning of a space cabin simulator because it forms toxicchlorinated acetylenes. Atmospheric contaminants were also measured during a 30-day test of the space cabin simulator by 4 men.

09781

Environmental Science Services Corp., Stamford, Conn.

SOLVENT EMISSION CONTROL LAWS AND THE COATINGS AND SOLVENTS INDUSTRY. (A TECHNO/ECONOMIC STUDY.) 56 p., ((1967)). 6 refs.

The widespread adoption of the strict California solvent emission laws will seriously effect practices and products in the surface coating industry. The California codes contain three main elements: the emission of photochemically reactive solvents is restricted; the sale of coatings containing these materials is banned; and the emission of these materials during the manufacture of coating materials is restricted. Widespread adoption of these codes would cause changes in the formulation of the coatings, and would adversely affect the markets for mineral spirits, napthas, substituted aromatics, branched ketones, olefins, and trichloroethylene. However, alcohols, esters, odorless mineral spirits, and glycolesters would gain markets at the expense of the photochemically active solvents. Emission control methods, analytical techniques, and measurement methods are outlined. The effectiveness of various organic solvents in photochemical smog formation is discussed. An evaluation of existing regulations, with emphasis on California Rule 66, is presented along with lists of exempt sources.

10283

Fink, C. K. and J. E. Weigel

OXYGENATED SOLVENTS. Paint Varnish Prod., 58(3):45-48, March 1968.

The restriction of some solvents in alkyd surface coatings has caused the coating industry to study acceptable oxygenated solvents and exempt hydrocarbons as possible substitutes. To assist the formulators in developing new systems with equivalent coating properties, recent research has provided essential information on viscosity-composition relationships for the solvents. This data, along with volatility considerations, can be used for the selection of alkyd resin solvents which comply to air pollution regulations.

10660

Laffey, William T. and Robert N. Manning

SOLVENT SELECTION FOR THE REDUCTION OF AIR POLLUTION. Hercules Chem., No. 56:1-6, March 1968. 5 refs.

Regulations restricting the use of solvents which partake in photochemical smog reactions have caused the solvent and surface coating industries to develop alternate solvent formulations. A system is presented whereby a restricted solvent can be simulated using combinations of allowable materials. The procedure is graphical and depends on the solvent parameters and solubility characteristics of the materials. When several formulations are found which possess the required solvent properties, the choice of the best one then depends on economic or other factors.

11546

CONTROL OF ORGANIC SOLVENT EMISSIONS INTO ATMOSPHERE. (Third Interim Report), Aerospace Industries Association of America, Inc., Washington, D. C., 175p., 1968.

The results of work to find aerospace industry solvents and coatings which comply with Los Angeles Rule 66 are presented. Involved are protective coatings, solvents, and thinners; solvents for cleaning and degreasing; chemical milling maskants and shop protective coatings; and plastics and adhesives. Data and evaluation reports are presented on coating and primer substitution degreasing solvents, inhibited 1,1,1 trichloroethane vapor degreasing, aqueous cleaning compounds, chemical milling, maskants, temporary protective alkaline removable coatings, and shop protective coatings.

12084

Fink, C. K. and J. E. Weigel

OXYGENATED SOLVENTS. REFORMULATING NITROCELLULOSE LACQUERS. Paint, Varnish, Prod., 58(12):38-43, Dec. 1968.

Oxygenated solvents in combination with allowable aromatic and exempt hydrocarbon diluents have been accepted as an approach to compliance with air pollution controls. A guide to reformulation based on recent research into solvent composition-solution viscosity relationships is presented. Data are presented relating the composition of complying solvent systems to viscosity of nitrocellulose solutions prepared with these solvents. In addition to viscosity, a solvent mixture must have a balanced evaporation rate. A listing of acceptable solvents by relative evaporation rate is also presented.

12122

Pustinger, J. V., Jr. and F. N. Hodgson

INDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS. Monsanto Research Corp., Dayton, Ohio, AMRL Contract F33615-67-C- 1357, Proj. 6302, Task 630204, AMRL-TR-68-27, 161p., July 1968. 2 refs. CFSTI, DDC: AD 675177

Fifty-three candidate materials for space cabin construction including various silicones, rubbers, expoxies, and coatings, were tested to establish volatile gas-off and oxidation products. Testing was accomplished by two methods: preliminary screening by thermogravimetric analysis to determine weight loss between 0.001% and 1.0%, exclusive of water, during 24 hours at 25 C to 68 C in a nitrogen atmosphere at 5 psia; and, for materials within this range, storage tests at 68 C for 72 hours and at 25 C for 30 and 60 days in oxygen at 5 psia, followed by analyses of the chamber gases, to determine the nature of the individual components evolved from the candidate material. Those materials falling outside this range were conditionally excluded from further tests. Weight loss data, thermogravimetric curves, gas chromatograms of volatile contaminants, and the nature and quantities of individual components evolved from the candidate materials are reported. In addition to the gas-off experiments, gas chromatographic and mass spectrometric analyses were performed on seven samples of atmospheres from bio-environmental systems. Considerable differences in levels of volatiles were observed. A major contributing factor is the adsorption of volatiles on the chamber walls. Although thermogravimetric measurements are useful, a more direct, measurement of water at the sample site is needed to provide more reliable data. The use of a hygrometer probe at the sample site is recommended. The types of compounds detected included carbon monoxide, alkanes, alkenes, alcohols, alkyl halides aldehydes, ketones, ethers, aromatic hydrocarbons, phenol, and silicon compounds.

12641

H. A. Newnham

METALLIC LEAD PRIMERS. A REVIEW. Paint Technol., 32(10):16, 18-20, Oct. 1968. 31 Refs.

The earliest reference to the rust inhibiting properties of metallic lead primers was made by J. N. Tervet in 1924. The literature relating to the exposure characteristics of metallic lead priming paints and the underlying chemical mechanisms of these primers is reviewed.

18751

Lunche, R. G., A. Stein, C. J. Seymour, and R. L. Weimer

EMISSIONS FROM ORGANIC SOLVENT USAGE IN LOS ANGELES COUNTY. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 37p., 1957. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 50th, St. Louis, Mo., June 4, 1957.)

Organic solvent usage in Los Angeles County approaching 600 tons/day was determined on the basis of surveys. After adjustment for solvents shipped out of the county, disposed of in control equipment, and discarded in liquid or semi-liquid wastes, an estimated 400 tons are vaporized into the atmosphere. Volume-wise, the most important individual solvents, in order, are the aliphatic hydrocarbons boiling within

300-400 F, iso-propyl alcohol, ethyl alcohol, methyl ethyl ketone, trichloroethylene, acetone, methyl alcohol, toluene, xylene, methyl iso-butyl ketone, and perchloroethylene. The major markets for organic solvents are surface coating manufacturers, dry cleaners, aircraft companies, automobile assemblies, rubber product manufacturers, and can and container manufacturers. Major sources of evaporation include surface coating operations, dry cleaning, and degreasing. (Author abstract modified)

23843

Merz, Otto

PRACTICAL DETERMINATION OF GASES FROM VARNISH DRYING OVENS. (Praxisnahe Bestimmung von Abgasen aus Lacktrockenoefen). Text in German. Blech 15(1):12-16, Jan. 1968. 19 refs.

An exact chemical analysis of gases emanating from lacquer drying ovens which are a complex mixture of various organic compounds of unknown exact composition can be accomplished only by a combination of gas chromatography, flame ionization detection, and infrared spectroscopy. The emission consists largely of solvents which can be dealt with by catalytic combustion and of less than 1% decomposition products the smell of which is sometimes objectionable. Some sulfur dioxide is also generated if fuel oil i used in the installation. Maximal permissible work site concentrations and maximal permissible emission levels of various solvents and formaldehyde, furfurol, mono- di- and trimethylamine, mono- di- and triethylamine (which have in 1964 been reduced to up to one tenth of their former levels) are reviewed. Portable explosimeters are used for the determination of the concentration of combustible gases, vapors, and their mixtures with air for concentration within a range of up to the lower explosion limit. Especially suited for gas emanations from lacquer drying ovens are gas detectors using detection cartridges for almost all solvents and lacquer decomposition products such as phenol, monostyrol, polyacrylate, formaldehyde, and acrolein. A color conversion of the test substance in the cartridge represents a qualitative and sometimes a quantitative test of the presence of the objectionable substance. The presence of 100 mg hydrocarbon N/cu m is considered to be the upper permissible limit, but the figure is arbitrary because the olfactory threshold of various compounds varies widely.

24096

Doorgeest, T.

PAINT AND AIR POLLUTION. (Verf en luchtverontreiniging). Text in Dutch. T. N. O. Nieuws, vol. 25:37-42, 1970.

Dutch paint manufacturers are well aware of the fact that application of the products of the paint industry does contribute to air pollution. This awareness has resulted in a joint investigation by paint manufacturers and TNO into the contribution of paint producers and paint users to air pollution in the Netherlands. From information received mainly from members and co-members of the Vereniging Voor Verf-Research (Dutch Society for Paint Research) it was calculated that paint producers and paint users are together responsible for approximately 0.1% of the harmfulness of air pollution in the Netherlands. Moreover the conclusion was drawn that the percentage mentioned will decrease slowly in the coming years. (Author abstract modified)

24754

Franzky, U.

RESULTS OF THERMAL AND OF CATALYTIC PROCESSES TO LIMIT OLFACTORY EMISSIONS OF ORGANIC CHEMICAL COMPOUNDS. (Ergebnisse thermischer und katalytischer Verfahren zur Einschraenkung geruchsintensiver Emissionen organisch-chemischer Verbindungen). Text in German. Landesanstalt fuer Immissions-und Bodennutzungsschutz, Essen (West Germany), 9p., 1970 (?). 13 refs.

A reliable process for the elimination of emissions of organic chemical compounds with an objectionable smell is thermal combustion. Organic compounds are completely destroyed by heating the exhaust gas flow to above 800 C for a sufficiently long time. The process is expensive because the oxidation does not generate heat. The concentration of olfactory substances is always minute and all heat for the combustion has to be provided from the outside. Catalytic combustion which achieves satisfactory combustion at temperatures between 350 and 400 C is therefore used more frequently. Such temperatures can often be produced by means of heat exchangers. But catalytic purification cannot be applied universally because dust and other admixtures (phosphorus compounds for example) can prematurely deactivate the catalyst. With catalytic combustion at temperatures above 350 C, residual concentrations are largely independent of the nature and quantity of the original impurities. The effectiveness of these processes is judged by the carbon content of the gas before and following combustion. Thermal and catalytic installations designed to reduce objectionable emission from lacquer drying furnaces, from polyvinyl chloride jelling canals, from coffee and malt roasting drums, from curing chambers and other emission sources are described.

29526

Sletmoe, G. M.

THE CALCULATION OF MIXED HYDROCARBON-OXYGENATED SOLVENT EVAPORATION. J. Paint Technol., 42(543):246-259, April 1970. 18 refs. (Presented at the Federation of Societies for Paint Technology, Annual Meeting 47th, Chicago, Ill., Nov. 6, 1969.)

A hypothesis regarding the evaporation of hydrocarbon-oxygenated solvent blends from paint films is derived theoretically, justified experimentally, and generalized to a usable routine consisting of three steps: a quantitative calculation of rate and balance in the initial neat solvent evaporation; a qualitative extension of this to the entire neat solvent evaporation; and guidelines for relating neat solvent evaporation to evaporation from the fully formulated paint film. A generalized system of escaping coefficients is provided for this calculation. (Author abstract)

29984

Tatsukawa, Ryo

A NEW ENVIRONMENTAL POLLUTANT - POLYCHLORINATED BIPHENYLS (PCB). (Atarashii kankyo osen busshitsu - Enka jifeniiru (PCB)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(5): 419-425, May 1971. 22 refs.

The new environmental pollutant, Polychlorinated biphenyl (PCB) is discussed as to its physical and chemical properties, physiological effects and toxicity, actual cases of pollution, and analysis methods. PCB is a biphenyl whose hydrogen has been substituted by chlorine. It comes in various forms of chlorine compounds (theoretically 210 kinds in all) such as mono-, di-, tri-, tetra-, penta-, hexa-, hepta- and decachlorobiphenyls, each of which also comes in a number of variations. Many PCB products are commercially available. PCB is chemically inert, so that it does not react with acid, alkali, or water and is insoluble in water. It does dissolve well in organic solvents and never dries even when exposed to air after being shaped like a film. Also, PCB is thermoplastic and incombustible except with low chlorine compound content. It adheres well to smooth metal surfaces and glass and will not corrode them, even at high temperature. Highly heat- insulating and super dielectric, PCB has a wide range of applications. The most popular use is as a transformer and capacitor oil; also it is used as a coating for electric wire, insulators, and carbon resistors. When mixed with asphalt and ethylcellulose, PCB forms a protective coating for lumber, metal, and concrete; it also can be mixed with paint and varnish. Another use is as an additive for natural and synthetic rubber, floor tile, printing ink, and brake linings. While its toxic effect is chronic rather than acute, PCB s toxicity on fish is less than DDT. Lichtenstein and other countries report its toxicity is 1/8000- 1/1000 compared with Dieldrin and 1/300-1/30 compared with DDT. Marine pollution by PCB and its effect on fish and other living things is described to show its chronic effect. Cases of Chloracne a skin disease, have been caused by PCB.

31649

McCaldin, Roy O.

ESTIMATION OF SOURCES OF ATMOSPHERIC LEAD AND MEASURED ATMOSPHERIC LEAD LEVELS. Public Health Service, Washington, D. C., Symp. Environ. Lead Contamination, 1965, p. 7-15. 15 refs. (Dec. 13- 15.) (PHS Pub. 1440.) NTIS: PB 198104

Literature on sources of lead emissions and atmospheric lead levels is reviewed. Emissions resulting from insecticide, storage battery, and paint manufacture are discussed. Other possible lead emission sources are municipal incineration, burning dumps, burning waste materials associated with building demolition, and combustion of lead-burning fuels. Re-entrainment into the air of lead-bearing soils is a source of pollution but only a minor contribution for urban soils. The use of emission inventories as a point of departure to estimate the relative quantity of lead emitted when coal and gasoline are burned is discussed. Data on atmospheric lead levels for specific urban areas are presented. The conclusions indicate that data on lead emissions and its sources are minimal. Based on available data, the principal source of atmospheric lead in urban areas is combustion of leaded gasoline.

32351

Lemke, Eric E., George Thomas, and Wayne E. Zwiacher

PROFILE OF AIR POLLUTION CONTROL IN LOS ANGELES COUNTY. Los Angeles County Air Pollution Control District, Calif., 66p., Jan. 1969.

A profile of air pollution sources, the effectiveness of the control program, and a projection for the future in Los Angeles are presented. The Federal Clean Air Act of 1967 figures prominently in the future projections, because it is assumed that California will set motor vehicle emission standards more stringently than the Federal standards. About 13,500 tons of air contaminants are still being emitted daily, primarily because of automobile emissions which comprise approximately 90% of the uncontrolled emissions. Major sources are listed with data on type and amounts of particulates emitted, and the amounts prevented. Motor vehicle sources include exhaust, blowby, and evaporation in gasoline-powered engines and diesel-powered engines; the prevention methods for motor vehicle emissions include crankcase and exhaust control. Other sources include organic solvents (surface coating, dry cleaning, and degreasing), chemicals (sulfur and sulfuric acid plants), incineration, non-ferrous metal production, cupolas, electric steel furnaces, open hearths, mineral production (including asphalt), and petroleum (refining, marketing, and production). Rule 62 prevents contamination from power plants and other fuel combustion processes. Jet and piston driven aircraft, ships, and railroads are also sources. Contaminants include nitrogen oxides, sulfur dioxide, carbon monoxide, hydrocarbons, and particulates. The distribution of chemical processing equipment, boilers, heaters, paint bake ovens, incinerators, metal melting equipment, concrete batch plants, petroleum processing equipment, rendering equipment, and power plant boilers are shown. Daily emissions from fuel oil, natural gas, and refinery make gas are shown. Also, steam and electric power plants are discussed. When motor vehicle exhaust reacts with the air, photochemical smog can be formed which causes eye irritation; the California Pure Air Act has set standards which should eliminate this. Stationary and mobile sources, air monitoring stations, seasonal changes, ozone concentrations, wind effects, daily concentration levels, oxidant levels, and alerts are also discussed.

32855

Ishiguro, Tatsukichi, Kazuo Hishida, and Tsunehiro Yajima

PRESENT STATE OF PUBLIC NUSIANCE CAUSED BY OFFENSIVE ODORS IN TOKYO. (Tokyo ni okeru akushu kogai no genjo). Text in Japanese Yosui To Haisui (J. Water Waste), 13(8):972-978, Aug. 1971.

Control criteria were designated for emissions of smoke, gases, and offensive odors in Tokyo. The harmful gases included ammonia, fluorine and its compounds, hydrogen cyanide, carbon monoxide, formaldehyde, methanol, isoamyl alchohol, isopropyl alcohol, hydrogen sulfide, hydrogen chloride, acrolein, acetone, sulfur dioxide, benzene, nitrogen oxides, toluene, phenol, sulfuric acid, and chromic acid. The public Nuisance Bureau received 2751 complaints about offensive odors and 416 complaints about deleterious gases during 1970. The major sources of the offensive odors were plants processing fish guts and bones, animal bones and fat, and feathers, stock yards, poultry farms, urban waste disposal plants, sewage treatment plants, fish oil processing plants, varnish manufacturing plants, lubricant oil regenerating factories, soy sauce lees and other vegetable protein processing plants, organic fertilizer manufacturing plants, and food manufacturing plants. Deodorization experiments were conducted with respect to the analysis of the components of odors, deodorizing devices, sensory tests, interrelation of odor constituents, and process improvements.

33570

Poole, W. Kenneth and Donald R. Johnson

ESTIMATING POPULATION EXPOSURE TO SELECTED METALS - TITANIUM. (FINAL REPORT). Research Triangle Inst., Research Triangle Park, N. C., NIEHS Contract PH-86-65-109, RTI Rept. AU-229, Rept. NIH-ES-2434, 101p., March 1969. 50 refs. NTIS: PB 195819

Three aspects of titanium in the environment are discussed: the flow of titanium from the time it is mined until it is consumed; the exposure of subpopulations occupationally exposed to titanium; and the exposure of the general population to titanium via air, food, and water. Occupational exposure to titanium in the air has been found to be absent. Apart from open pit operation, the mining industry has no significant exposure problem. Among manufacturers using titanium concentrates, pigment plants and titanium metal plants have been suggested as sources of possible excessive exposure. Exposures to titanium dioxide pigment may be considerable in some manufacturing processes, such as rubber, and negligible in others, such as hosiery. Assuming a daily respiratory volume of 20 cu m, the amount of titanium taken into the body by inhalation of urban air is 1.2 milligram/day. Deposition of particulate matter in the lung is a function of particle size; a mass median diameter of 0.3 micron is assumed. The daily retention fo titanium has been estimated to be 0.32 milligram. This estimate reflects that portion of deposited titanium not removed by lung clearance mechanisms. Food appears to be the significant source of titanium exposure to the general population; estimated titanium dose from a typical diet is 607 milligrams. Normal water intake is three milligrams.

34571

Merz, Otto

LACQUERS AND COATINGS FOR SURFACE TREATMENT AND POSSIBLE IMMISSIONS. (Lacke und Beschichtungsstoffe zur Oberflaechenbehandlung und moegliche Immissionen). Text in German. Staub, Reinhaltung Luft, 31(10):395-396, Oct. 1971. 5 refs.

Emissions develop during the drying process of lacquered or coated surfaces. The process takes place at different temperatures. A heating-up zone and a drying or reaction zone must be distinguished. In the first zone with temperatures between 80 and 150 C, high and medium volatile solvents, monomeres, and oligomeres evaporate. In the second zone between 160 and 200 C, the solvents, monomeres, and oligomeres which are difficult to volatilize evaporate. Aliphatic hydrocarbons, hydrogen chloride, alcohols, aldehydes, phenols, ketones, and acid amines are split off from solvents and binding agents. Zinc oxide and soot may be emitted during the combustion of fuel oil.

34585

Meuthen, Bernd

WASTE AIR PROBLEMS IN THE COIL COATING INDUSTRY. (Abluftfragen aus der Sicht der coil coating-industrie). Text in German. Staub, Reinhaltung Luft, 31(10):407-410, Oct. 1971. 23 refs.

During the coil coating process, organic gaseous emissions develop. The gaseous emissions are primarily composed of volatilized organic solvents of a known nature, as well as components developing during the reaction of the binding agents and solvents on the hot furnace walls. Such reaction products are marked by annoying odors. According to the present experience, they amount to approximately four percent of the solid content. Type and quantity of the organic emissions are subject to great temporal fluctuations. The fraction of hydrocarbons emitted by such plants amounts to 0.1% of the total hydrocarbon emissions. Regulations in North Rhine Westphalia require cleaning of such waste gases to a residual carbon content of 300 mg/cu m. In other West European countries, no such stringent regulations exist. In the U. S., the use of certain solvents is prohibited and the emission quantities are limited. Catalytic combustion has been used as a control method. But this method is not very suitable because of catalyst poisoning. Thermal afterburning has found little application in Europe, but is the accepted method in the United States. The best solution would be the use of coating material which is free of solvents. Such coating material is available in form of so called power lacquers whose quality has yet to be improved for satisfactory use. A special method of lacquer drying, electron beam curing, is in the developmental stage. With the method, none of the present solvents will cause any emissions.

34763

Fonteyn, M.

IS THE PAINT INDUSTRY RESPONSIBLE FOR THE POLLUTION OF OUR ENVIRONMENT? (L industrie de la peinture est-elle responsable de la pollution de notre environnement). Text in French. Tribune CEBEDEAU (Centre Belge Etude Doc. Eaux), 24(327):67-69, Feb. 1971. (Presented at the Congres de la Federation des Jeunes Chefs d Enterprises d Europe, Brussels, Belgium, Nov. 6, 1970.)

Paint is a material which contains oil and/or synthetic resin, pigments for opacity and color, and in most cases, solvents and diluents to achieve sufficient fluidity for application. A study made by the Dutch Institute for Paint Research shows that 37,000 tons of pollutants from the paint industry were emitted into the air in 1968 in The Netherlands. The largest portions of this total are 15,500 tons of aliphatic hydrocarbons (solvents) and 11,500 tons of aromatic hydrocarbons. The remaining pollutants are methyl alcohol, esters, ketons, halogenated carbon compounds, and other hydrocarbons. About 210,000 tons of the above pollutants originated from all sources, so that the paint industry appears to have been responsible for 18% of the air pollution caused by these emissions. The overall air pollution in the same period of time, including major emissions of carbon monoxide and sulfur dioxide, was estimated at two million tons; the paint industry then accounts for less than 2% of the total. Efforts are underway to develop effective control techniques.

35957

Tada, Osamu

METAL FINISHING INDUSTRY AND ENVIRONMENTAL HEALTH. (Hyomen shori kogyo to kankyo eisei). Text in Japanese. Hyomen Shori Janaru (Metal Finish. J.), 4(4):62-66, April 1971.

The effects of various metal finishing processes such as welding, coating, and plating on the working environment and the maximum permissible concentration of pollutants are reviewed. In metal plating pretreatment, inhaling of vapors of trichloroethylene or perchloroethylene can damage nervous system and liver. Various acid baths give off mists, nitric oxide, and nitrogen dioxide, which can cause respiratory disorders, bronchitis, and pneumonia. Electrolysis mist can cause inflammation of membranes in the nose and throat. Inhalation of zinc fume can cause headache, exhaustion, debility, high fever, but the effects are not long-lasting. Ammonium chloride inhalation causes discomfort, but poisoning cases have not been reported. Ammonia can irritate eyes and respiratory systems. Lead can cause chronic disorders to blood cells, digestive systems, or nervous systems. Common effects of organic solvent used for paints, coating, and sealing materials are paralysis of the body, irritation of skin and membranes, and disorders of liver, kidney, nerve, and blood. During paint spraying, skin damage can occur, particularly with epoxy-based plastic. During the drying of paints, thermal decomposition of melamine creates formaldehydes, which irritate eyes, irritate the respiratory system, and cause general discomfort. Maximum permissible concentration is five ppm, but even one to two ppm creates a considerable irritation of eyes and noses. A harmful amount of ozone can be created in welding by inert gas arc, especially when welding nonferric metals. A concentration of one to two ppm causes headache, dizziness, nausea, and higher concentrations cause bronchial and lung inflammations.

37190

ENVIRONMENTAL PROTECTION AND CULTIVATION OF THE ENVIRONMENT IN LOWER SAXONY. (Umweltschutz und Umweltpflege in Niedersachsen). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(11):266-267, Nov. 1971.

The emission limit values for sulfur dioxide and dust are exceeded in Lower Saxony during normal weather conditions only in individual critical areas. In the Nordenham area the soil and the vegetation are heavily enriched with lead and zinc dust, sulfur dioxide, and fluorine. The lead content of the soil has reached 120 times and zinc has reached 150 times the normal values. The milk of animals grazing in this area has to be heavily mixed with other milk in order to make it drinkable. In Delmhorst, the natural composition of the air is changed by the emissions of a linoleum plant and a lacquer-resin plant. During the oxidation of linseed oil and the melting of resins, acrolein, formic acid, acetic acid, and phenols are liberated. In Osterwald, the fluorine emissions of a ceramic plant has destroyed a large forest. Injuries in forests were also observed in Bad Salzdetfurth from the emissions of a potassium plant and near Munich by a cellulose plant. Animal mass breeding stations cause unbearable odor emissions in Suedoldenburg, Bersenbrueck, Diepholz, Bassum, and Nienburg.

37556

Zegel, William

WHAT S GOING OUT THE STACK? Ind. Finishing (Indianapolis), 46(12):13-15, 16B, Dec. 1970.

Stack tests were run at a coil-coating plant without any air pollution control devices in operation to obtain the true emissions from ovens and boilers. The tests included measurements of stack gas velocities and temperatures, and the concentrations of nitric oxide, nitrogen dioxide, total aldehydes as formaldehyde, carbon monoxide, carbon dioxide, total hydrocarbons as propane, and particulates. From the measured emissions, emission factors based on the rate of burning gas and the rate of application of volatile material to the strip were computed. The hydrocarbons were the largest emissions, the main proportion of the hydrocarbons were aromatics containing 8-10 carbon atmos. Emissions of carbon monoxide, nitrogen oxides, and even aldehydes were not large when compared to many industrial processes or even to automotive equipment. The emission factors can be used to estimate emissions at similar plants without control devices.

37681

Iliff, Neil

ORGANIC CHEMICALS IN THE ENVIRONMENT. New Scientist, 3(781):263-265, Feb. 3, 1972.

World-wide, up to 20 million tons of manufactured organic chemicals enter the environment annually. The majority of organic chemicals (about 75%) are processed either in their place of manufacture or elsewhere. Over two-thirds of the latter are used to synthesize end-products, e.g., plastics and resins, synthetic fibers, rubber, and surface coatings. Of the remaining 25%, consisting of chemicals used as such, the greater part is further processed within the industry itself to produce such products as solvents, glycols, and detergents. Of the gaseous basic chemicals used as manufacturing building blocks, up to 1 million tons yearly enter the environment. Problems of liquid effluent disposal from chemical works are also serious. The contribution of lubricants and industrial oils to air and water pollution may add up to more than 2 million tons annually. Two case studies of major man-made organic chemicals, ethylene and chlorofluorocarbons, are considered. The chemicals that need to be studied are those that do not occur in nature, and for which degration pathways may not exist. Further and more objective research is imperative.

37996

Escourrou, R.

THE SCOURGE OF POLLUTION. (Le fleau de la pollution). Text in French. Papeterie, 93(11):1025-1026, 1029-1032, 1035-1038, 1041-1045, Nov. 1971.

Air, water, and noise pollution are discussed. Dust generation is discussed, with particular emphasis on cement works. Gaseous pollutants include sulfur dioxide, fluorine derivatives, carbon monoxide, and odors (from spray painting shops, animal food production, and motor vehicle exhausts). The sampling of air is briefly described, as well as methods of determining concentrations of sulfur dioxide, fluorine, and dust. Water pollution, effects on fish, and sources of water pollution are discussed. Pollution of the sea by atomic fallout, residual oil, effluents from coastal industries, and the discharge from sewers is discussed. A suggested permissible noise limit for city conditions would be 80 to 85 decibels. A motor vehicle traveling at 50 mi/hr exceeds this noise level.

38307

Davis, J. B.

POLLUTION – THE EUROPEAN SCENE. Polym., Paint Colour J., 161(3810):82-86, Jan. 19, 1972. 8 refs. (Presented at the Chemical Coaters Association, Conference on Pollution, Chicago, Ill., Dec. 1971.)

Governments in all European countries have been alerted to the dangers of pollution, and in consequence stricter regulations are inevitable. The paint industry will have to meet these changes by reformulation, redesign of equipment to eliminate all forms of pollution, and better housekeeping. The four areas of pollution that concern the industry are vapor emissions during manufacturing and use; the emission of noxious odors from resin manufacturing and the storing of industrial paints; contamination of waterways by liquid waste; and the disposal of solid waste. Both thermoset and thermoplastic nonaqueous dispersion enamels will materially assist control of air pollution. Powder coatings and water-based enamels and primers also help to reduce the solvent hazard. The solution to the problem of liquid waste appears to be use of multiple settling tanks for removal of suspended solids, with control of pH prior to discharge. The destruction of organic contaminants and surfactants by natural bacteria is being studied. Solid waste, except plastic, is preferably disposed of by incineration. The answer to the problem of plastic containers may be to use them as the basis for new surface coatings. Decisions concerning the degree and nature of pollution control and abatement will require comprehensive cost-benefit calculations. The industry must take part in these decisions and calculations.

40303

Fox, Raymond D. and Steven H. Chansky

STATEWIDE EMISSION INVENTORY OF SOUTH DAKATA. GCA Corp., Bedford, Mass, GCA Technology Div., Office of Air Programs Contract 68-02-0041, GCA-TR-71-5-G, 67p., Aug. 1971. 48 refs. NTIS: PB 204947

The principal pollution sources and annual emission levels for particulates, sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides by source category were investigated within an emission inventory for South Dakota. The major source categories were stationary fuel combustion sources, transportation sources, solid waste disposal, and process losses. The primary source of particulate emissions was process losses from industrial point sources, including mining, stone quarrying, cement and asphalt batch plants, and terminal and country grain elevators. Sulfur dioxide emissions were produced from a wide variety of categories including coal combustion by power plants and industrial establishments (32%), domestic heating using distillate oil (23%), commerical-institutional-industiral fuel oil (21%), and transportation sources (21%). The primary sources of CO, hydrocarbons, and NOx emissions were gasoline- powered motor vehicles and off-highway gasoline used for farm tractors, with substantial contributions from petroleum bulk storage facilities, dry cleaning, solvent evaporation from surface coatings, and solid waste disposal. (Author summary modified)

40345

LaGrone, F. Scott and Clinton E. Burklin

FINAL REPORT FOR STATEWIDE EMISSIONS INVENTORY FOR THE STATE OF LOUISIANA. Radian Corp., Austin, Tex., Office of Air Programs APTD-0794, 77p., Sept. 8, 1971. 14 refs. NTIS: PB 204949

Area and point source emissions of sulfur compounds (sulfur dioxide and sulfur trioxide), particulates, carbon monoxide, nitric oxide, nitrogen dioxide, and hydrocarbons and their derivatives were calculated within an emission inventory for Louisiana. Procedures involved in gathering data on emissions and fuel consumption, determination of the grid systems, survey methodology, data analysis, and actual calculations of emissions are reviewed. The point sources included chemical processing, coal cleaning, detergent and soap manufacturing, ink manufacturing, paint and varnish production, fertilizer plants, synthetic fiber and rubber production, food and feed operations, rendering, primary and secondary metallurgical processes, mineral processes, petroleum refining, pulp and paper manufacture, dry cleaning, surface coating operations, gasoline marketing, steam-electric power plants, incinerators, and open burning dumps. Area source emissions were calculated from combustion and consumption data on coal, fuel oil, natural gas, residual oil, and distillate oil with vessels, railroads, diesel motor vehicles, gasoline motor vehicles, airport operations, solid waste disposal, and process losses as major area sources. Sample inventory forms, data tabulations, and area maps are included.

41896

Alpiser, Francis M., Marius J. Gedgaudas, and Harold B. Coughlin

POLLUTION SOURCES. In: Helena Valley, Montana, Area, Environmental Pollution Study. Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs, Pub-AP-91, p. 145-160, Jan. 1972. NTIS: PB 207126

An emission inventory covering sulfur oxides, particulate matter, nitrogen oxides, hydrocarbons, and carbon monoxide was made for the Helena Valley area in 1968. Although industrial processes are the primary emission sources in the Valley, fuel combustion in stationary sources, transportation, and open burning also contribute to the overall problem. The primary pollutant is sulfur dioxide, of which approximately 71,000 tons are emitted annually. Particulate emissions, totaling nearly 8300 tons, are lower than the actual amount, because dust from unpaved roads, for which there is no accurate means of measurement, is a major problem in the area. Carbon monoxide emissions amounted to approximately 22,000 tons, and nitrogen oxides and hydrocarbons totaled approximately 2600 tons and 2100 tons, respectively. Major pollution sources described include a lead smelter, a slag-processing plant, and paint pigment facility. Process descriptions are presented, and emissions and control measures at various operations of the facilites are described. The smelter emits a large amount of SO2 and a significant amount of dust. The pollutants are emitted through stacks at the electrostatic precipitator and the baghouse, with the emission rates depending on the charge rate to the sintering plant and the blast furnace. The fuming operation of the slag processing plant emits sulfur dioxide and particulates at the charging door of the furnace and through stacks at the baghouse. In addition, particulates are emitted through a stack at the coal-pulverizing mill, and particulates and SO2 are released when the residue slag is dumped. Available scrubbing processes for both the smelter and the slag-processing plant are described. The pigments operations emit sulfur dioxide and particulates in relatively minor amounts. Although the particulates probably contain small amounts of zinc, lead, and copper, no corrective action or modification of existing air-pollution control equipment appears necessary as long as the equipment is properly maintained and production output is not drastically increased.

43268

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

EVAPORATION LOSS SOURCES. In: Compilation of Air Pollutant Emission Factors. OAP Pub-AP-42, p. 4-1 to 4-6, Feb. 1972. 17 refs. NTIS: PB 209559

Evaporation losses and their sources are discussed. General processes in dry cleaning, surface coating, petroleum storage, and gasoline marketing are described. Hydrocarbon emission factors are given for petroleum solvents and synthetic solvents in dry cleaning operations; paint, varnish and shellac, lacquer, enamel, and primer (zinc chromate) for surface-coating applications; and for breathing and working losses from the storage of petroleum products. The emissions associated with gasoline marketing are primarily vapors expelled from a tank by displacement as a result of filling. Controls are mentioned.

43269

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

CHEMICAL PROCESS INDUSTRY. In: Compilation of Air Pollutant Emission Factors. OAP Pub-AP-42, p. 5-1 to 5-26, Feb. 1972. 65 refs. NTIS: PB 209559

Emissions from the manufacture and/or use of chemicals or chemical products are reviewed. Emissions are primarily gaseous and are controlled by incineration, adsorption, or absorption. Estimates of emission factors are based on material balances, yields, or similar processes. Process descriptions are given for: adipic acid, ammonia, carbon black (channel black, furnace and thermal black processes), charcoal, chlor-alkali, explosives (TNT and nitrocellulose), hydrochloric acid, hydrofluoric acid, nitric acid, paint and varnish, phosphoric acid, phthalic anhydride, plastics, printing ink, soap and detergents, sodium carbonate, sulfuric acid, synthetic fibers, synthetic rubber, and terephthalic acid. Significant emissions and control methods are given for the processes.

44107

Bare, Fred

THE SWISS LACQUER AND PAINT INDUSTRY AND ENVIRONMENTAL PROTECTION. (Die Schweizerische Lack- und Farbenindustrie und der Umweltschutz). Text in German. Chem. Rundschau (Solothurn), 25(29):937-939, 942, July 1972. 16 refs.

The Swiss lacquer industry comprises about 130 small and medium- sized companies. The annual production amounts to 65,000 tons. Until 50 years ago, mainly oil paints and enamel varnishes were used. They dried slowly, but contained few solvents. With the coming of nitrocellulose and alkyd resin lacquers and later of lacquers on the basis of chlorinated rubber, vinyl resins, polyurethane, and aethoxilin resins came also the air pollution problem. These lacquers contain solvents which enter the ambient air after application. Of the various solvent groups which are emitted, the various benzenes head the list, as far as emission quantity is concerned, followed by the aromatic hydrocarbons such as toluene and xylene. The basis for legal action against such enterprises in an effort to stem the solvent emission is provided by paragraphs 679 and 684 of the civil law code, the traffic law, and the work law of 1964. Measures can be taken when justified complaints against such an enterprise are voiced. In the near future guidelines will be issued concerning maximum allowable emissions. The pollutants are blown into the air from the workshops by ventilators; sometimes the waste air is passed over a filter. Generally, it can be said that the waste air problem in this industrial sector does not pose unsurmountable difficulties.

44184

Guenther, Rolf

A STUDY OF THE SUBSTANCES LIBERATED FROM BINDING AGENTS AT THE DRYING OF LACQUERS WITH RESPECT TO AIR POLLUTION. (Untersuchung der beim Trocknen von Lacken aus den Bindemitteln freiwerdenden Substanzen in Hinblick auf die Luftverunreinigung). Text in German. Karlsruhe Univ. (West Germany), Fakultaet fuer Chemie- Ingenieurwesen, Thesis (Ph.D.) 1971, 116p. 74 refs.

Laboratory studies on substances formed from binding agents during the drying of lacquers, and on the influence of temperature, furnace atmosphere, and time on such emissions are described. The samples obtained from waste gases by condensation were quantitatively and qualitatively analyzed by means of gas chromatography. The drying temperatures in the experimental drying furnace ranged from 80 to 200 C. Phenolformaldehyde and epoxy- formaldehyde lacquers released phenols and cresols in a total amount of 29.3-105.5 mg/cu m, and butanol in concentrations of 650- 1050 mg/cu m. Also small quantities of formaldehyde, ammonia, and phosphoric acid were detected. Alkyd, acryl, and epoxy ester lacquers were responsible for aromatics, terpenes, naphthenes, esters, and particularly phthalic anhydride in concentrations of 9- 39 mg/cu m, as well as for methacrylic acid, methylester (72-100 mg/cu m), benzene, and xylene. While the emissions from binding agents in a temperature range of 80-120 C were negligible, oxidative decomposition started above 140 C, and large amounts of products due to thermal decomposition above 200 C were observed. Rapidly evaporating solvents and nitrogen instead of oxygen atmosphere above 140 C had a positive effect. The bulk of the solvents and some 98% of the components formed from binding agents were found in the waste gases, and the respective concentrations were far above the maximum allowable values in many cases.

44373

Doorgest, T.

PAINTS AND ENVIRONMENTAL PROTECTION IN THE NETHERLANDS. (Verf en milieuhygiene in den Niederlanden). Text in Dutch. Verfkroniek, no. 44:190-212, June 1971.

Results of a survey on the contributions by paint manufacturing and processing industries to environmental pollution are presented. The basic pollutants from paint and lacquer manufacturing and processing were found to be sulfur dioxide from combustion processes, and solvent vapors, sprays, and liquid compounds from film-forming processes, such as drying, oxidative drying, and acid hardening. Aliphatics, aromatics, methanol, alcohols, esters, ketones, carbon halides, halogenated hydrocarbons, and volatile compounds are the chief air pollutants in this area. The investigations revealed that the contribution by paint and lacquer manufacturing and processing to global pollution is negligible with less than 0.1%, but certain control measures are still necessary.

45495

Taylor, C. G.

THE LOSS OF MERCURY FROM FUNGICIDAL PAINTS. J. Appl. Chem. (London), vol. 15:232-236, May 1965. 4 refs.

Reports have indicated that the use of mercury compounds as fungicides in paints may lead to poisoning of persons spending long periods in proximity to these paints. Radioactive mercury-203 was used to measure the loss of mercury from a fungicidal paint and to obtain values for the mercury concentration building up in an average sized room as a result of this loss. Although loss occurs, its rate is not likely to cause, in a normal sized, adequately ventilated room, a concentration of mercury greater than the maximum acceptable level for adult exposure. Mercury is lost somewhat more rapidly under wet conditions than dry ones. The conditions for wet exposure during the present tests simulated a humid atmosphere. Adequate ventilation is important during the first few days after application of such a fungicidal paint, since the loss-rate of mercury may then be several times greater than the loss-rate after three months. (Author abstract modified)

45858

Lukey, Michael E. and M. Dean High

EXHAUST GAS CONVERSION FACTORS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1972. (Presented at the Air Pollution Control Assiciation, Annual Meeting, 65th, Miami, Fla., June 18-20, 1972, Paper 72-88.)

The exhaust gas parameters from 76 combustion and industrial sources are given including fuel combustion processes, refuse incineration, mineral industries, chemical industries, metallurgical processes, pulp mills, and refineries. The main objective of the study was to define a relationship of the exhaust gases being emitted, to the process weights. Each of the 76 industrial source factors includes a process description, the potential air contaminants, operating time, abatement equipment, an input-output relationship, and the exhaust gas parameters: gas flow rate, gas temperature, gas velocity, and stack height. An attempt was made to relate the exhaust gas parameters to an input or output quantity. Thus by knowing the production rate of a plant, one can use these exhaust gas source factors and pollutant emission factors to obtain engineering estimates of specific plant emission and its community inpact through modeling. Sources include coal, oil, natural gas, and wood combustion, incineration; burners; chemical processes such as ammonia, carbon black, chlorine, hydrofluoric acid, paint, phosphoric acid, plastics, ink, soap, sulfuric acid, synthetic fibers, and rubber production; food and agricultural processes; primary metallurgy; steel, lead, zinc, and aluminum production including sintering, blast furnaces, electric furnaces, and open hearth furnaces; petroleum refining, pulp mills; dry cleaning; and surface coating.

46023

Vostal, Jaroslav

TRANSPORT AND TRANSFORMATION OF MERCURY IN NATURE AND POSSIBLE ROUTES OF EXPOSURE. In: Mercury in the Environment. A Toxicological and Epidemiological Appraisal. Karolinska Inst., Stockholm (Sweden), Dept of Environmental Hygiene, Office of Air Programs Contract CPA 70-30, Rept. APTD 0838, 108p., Nov. 1971. 1052 refs.

Findings of recent studies concerning the environmental sources and effects of mercury are summarized. Modes of entry of mercury into various media of the natural geocycle include simple transport in the form of metallic mercury vapors, transformation into volatilized organic mercury compounds, and chemical transformation into more soluble salts or mercury compounds. Manmade sources of mercury in the environment include the chlorine-alkali industry, the production of electrical apparatus, paint production, the pulp and paper industry, combustion of fossil fuels, mining and smelting of ores, and agricultural uses of organomercurial fungicides. Air over mercury deposits and over industrialized areas with high mercury emissions may accumulate higher concentrations of mercury mainly in zones near to the ground. Airborne mercury is continuously being removed from the atmosphere and deposited on the earth surface or water surface by rain or snow. Mercury transport through waters and aquatic and terrestrial food chains is also discussed.

46111

Klee, Otto

PCB IN THE WAKE OF DDT. (Nach dem DDT das PCB). Text in German. Kosmos (Stuttgart), no. 2:65-66, 1972.

General ecological problems of the contamination of the environment with polychlorinated biphenyls (PCB) are reviewed. The PCB, emitted ny the waste incinerators, or evaporating from paints containing PCB as plasticizer, may be present in the air, since it was actually detected in the air in London and Hamburg in 1966. The PCB, being much more stable than DDT, accumulates in adipose tissues, and attacks the liver. The PCB are able to decompose progesterone, testosterone, and estradiol into water-soluble products which are then eliminated from the organism by the blood and the kidneys. Investigations revealed thin eggshells and teratogenic malformation in fish and birds due to PCB.

46184

Turk, Amos

ODOR SOURCE INVENTORIES. Pollut. Eng., 4(5):22-24, Aug. 1972.

An inventory of odor sources may be used to predict the scope of odor control procedures needed for abatement, to relate odor sources to effects in the community, or to establish regulatory or enforcement policies. If it is assumed that different odor sources cannot be measured on an equal basis, then consideration must be given to the role of odor qualities. Odor quality classification systems are described, and a procedure is presented for translating quality descriptions into inventories of odor sources. Another method is based on the premise that a sample of odorous air can be described in terms of the volume to which it must be diluted for its intensity to be reduced to the sensory threshold level. Sources include foundries, bakeries, rendering, surface coating, petroleum refining, dry cleaning, and diesel engines. Organic nitrogen compounds, phenols, organic sulfur compounds, organic acids, solvents, and naphthalene are major odorants. Social and economic effects of odors are mentioned. (Author abstract modified)

46863

Sibbett, Donald J., Rudolph H. Moyer, and George H. Milly

EMISSION OF MERCURY FROM LATEX PAINTS. Am. Chem. Soc., Div. Water, Air Waste Chem., Gen. Papers, 12(1):20-26, 1972. 5 refs. (Presented at the American Chemical Society, National Meeting, 163rd, Boston, Mass., April 1972.)

To determine the levels of total mercury emanating from surfaces after application of a latex paint, the walls of a room measuring 5.36 by 4.37 by 2.47 m were given one coat utilizing standard roller and brush methods. A total of 0.28 g Hg combined as fungicide was involved. Hg concentrations were determined by photometry. During its application, the permissible limits for mercury organic compounds of this type in the air as recommended by the American Conference of Governmental Industrial Hygienists, a time-weighted average of 50 micrograms/cu m, was not exceeded with the paint sample tested. However, under inappropriate conditions, such as poor air circulation and high temperatures, this limit could be exceeded during painting operations despite the low mercury concentration in the liquid paint sample. Indoors, the mercury vapor concentration after application of the paint was approximately a thousand times that of the ambient, out-of- foors atmosphere after 220 hours. On the basis of a ventilation analysis, it appears that mercury containing vapors will remain in the air almost indefinitely. It seems reasonable that a normal human exposed to the specific experimental environment would absorb approximately 36 micrograms of mercury containing compounds in 16 hours.

47112

Hansen, Charles M.

SOLVENTS FOR COATINGS. Chem. Technol., 2(9):547-553, Sept. 1972. 49 refs. (Presented at the American Chemical Society, National Meeting, New York, N. Y., 1972.)

The newer concepts and techniques of using solvents in the coatings industry are discussed. There are many criteria to be met before a solvent composition is finally worked out for a given application. The most common current goal is to arrive at the least expensive blend which meets the requirements of volatility, solvency, and air pollution regulations. Current regulations limit the use of aromatic hydrocarbons, solvents containing olefinic unsaturated, substituted aromatics, ketones with a tertiary hydrogen atom, and trichloroethylene. Solubility relationships, determination of the polymer solubility parameter, use of solubility parameter data, and surface characterization are discussed. Potential applications of the solubility parameter are indicated.

47148

Ordinanz, Wilhelm

COMPILATIONS OF EMISSION CHARACTERISTICS IN THE USA. (Mitteilungen ueber Emissions-Kennzahlen in den USA). Text in German. Staub, Reinhaltung Luft, 32(10):399-400, Oct. 1972. 2 refs.

The German literature provides only scattered data on the gaseous emissions of power plants, steam boilers, industrial furnaces, and incinerators. The Technical Directives On the Maintenance of Clean Air and numerous VDI guidelines supply only maximum allowable dust concentrations in emissions. In the United States, however, emission inventories are available for several industrial areas. The emission characteristics of coal-fired furnaces, of metallurgical processes of fuel-oil-fired and natural-gas-fired furnaces, and incinerators are listed in tables. In another table the emissions of frequent working processes such as welding, lacquering, degreasing, and drying are listed. Pollutants include nitrogen oxides, particulates, sulfur oxides, carbon monoxide, aldehydes, benzopyrenes, ammonia, and organic acids.

47708

Meuthen, Bernd

CLEAN AIR MAINTENANCE-RELATED PROBLEMS FROM THE COIL COATING INDUSTRY VIEWPOINT. (Probleme der Luftreinhaltung aus der Sicht der coil coating-Industrie). Text in German. Fachber. Oberflaechentech., 10(7):231-235, 1972. 12 refs.

Problems of pollution control in the coil coating industry are reviewed. Coil coating plant-generated emissions constitute complex gaseous mixtures of solvents with partly unknown, though malodorous, reaction products as well as various additives of organic nature. The contribution by the coil coating industry to overall air pollution is estimated at well below 1%. The emissions, practically independent of the specific heat treatment process, are in the neighborhood of 3 g/N cu m. Catalytic waste gas incineration for odor destruction, in a temperature range of 250-500 C, proved not to be feasible due to catalyst poisoning. Thermal incineration in a temperature range of 600-800 C and at a reaction time of 0.5-1.5 sec represents, however, a solution of practical interest. The use of water-dispersible acrylates, polyesters, oxides, solvent-free powder lacquers, or the electron beam curing process are potential methods for the abatement of coil coating plant-generated emissions.

47879

Davis, J. B.

TWO POLLUTION--A CHALLENGE TO THE PAINT INDUSTRY. Paint Mfr., 42(9):10-11, 15, Sept. 1972.

Moves in the United Kingdom to combat nuisance problems from air pollution resulted in the Clean Air Acts of 1956 and 1968, and a recent Order under the Alkali Act brought the surface coating industry within its orbit for the first time by listing acrylate works and diisocyanate works as registrable under the Act. Potential pollution problems from industries that use organic finishes are mostly due to evaporating solvents and diluents and to by-products of baking finishes like acrolein and formaldehyde. Solvent vaports can be adsorbed by activated carbon or absorbed with a suitable liquid such as mineral oil. Direct flame and catalytic incineration are other possible control methods for organic emissions. There are six main types of water pollutants in the paint industry, some of which derive from emulsion paints, others which derive from solvent based products, and some which come from both types. A very effective control device is a good interceptor on the sewer line leaving the plant. This is basically a settling chamber that will do a reasonably good job of trapping suspended solids, heavy skins and sludges, solvents, and oils. Solid waste disposal is discussed, as well as noise pollution and toxicity dangers. Workers should be protected from infra sound, which is basically a low frequency consistent noise level which, while not as obtrusive as a loud noise, can cause drowsiness and fatigue. The paint industry uses lead, asbestos, mercury, and other materials with a known toxicity; increasing usage of polyurethanes and epoxies also brings into use new curing agents with irritant properties. Research into this area can take several forms covering products which do not pollute, application methods, alternative methods of resin curing, and methods of manufacture.

47963

Bundesministerium des Inneren, Bonn (West Germany), Arbeitsgruppe Chemische Industrie

CONTRIBUTION OF THE CHEMICAL INDUSTRY PROJECT GROUP. (Beitrag der Arbeitsgruppe Chemische Industrie). Text in German. In: Materialien zum Umweltprogramm der Bundesregierung 1971. Umweltplanung. Lower House of Parliament, 6th Session, Document 6/2710, p. 395-461, Oct. 1971.

Environmental protection-related problems and objectives in the chemical industry of West Germany are reviewed. The total sulfur dioxide, nitrogen oxide, carbon monoxide, chlorine, hydrochloric acid, fluorine compound, hydrocarbon, and dust emission concentrations in 1969 were 60,000, 25,000, 50,000, less than 100, 1000, 200, 100,000, and 10,000 tons, respectively. Qualitative and quantitative determination methods and emission standards for various pollutants, and means of pollution control (such as cyclones, electrostatic dust precipitators, tissue filters, scrubbers, fiber filters, and thermal, catalytic, and wet incinerators) are reviewed. Problems and projects in pollution control area in various branches of the chemical industry (inorganic raw materials, petroleum and natural gas, organic intermediaries, organic paints, monomers, pesticides, pharmaceutical products, detergents, pulp and paper, leather, textiles, starch, sugar, and beer) are outlined.

B. CONTROL METHODS

01543

RESPIRATORY PROTECTION. Safety Maintenance 132(1):25-28, July 1966.

Brief descriptions of newly developed respiratory protective equipment are given. This equipment includes a disposable hood for protection from mists, vapors, and contaminants, a belt attached respirator filter and an oral-nasal respirator. Respiratory equipment for protection against paint and radioactive dust is also described.

02112

J. Westchester.

PREVENTION OF AIR POLLUTION BY FUMES FROM BAKING FINISHES. Metal Finishing 64, (10) 702-77, Oct. 1966.

After reviewing regulations, particularly in Los Angeles County, for regulation of emission of organic solvents into the ambient air, the author lists critical solvents and their maximum permissible concentrations as established by the American Congress of Governmental Industrial Hygienists. He then goes on to review methods for disposing of waste solvents when finishes are baked on or cured at higher than room temperature. The most effective method is catalytic burning of the solvents; this method is employed in 2500 installations in the US and 1500 installations elsewhere. The disposal of chlorinated hydrocarbons and sulfur containing compounds is more complex and requires additional methods and equipment. Silicone coatings give SiO2 on combustion and coat the catalyst with a fine powder. The equipment for catalytic burning may be designed in several arrangements, but aerosol formation and condensation must be prevented before the vapors reach the exhaust fan, otherwise the efficiency of the catalyst may be impaired. Some installations recirculate the hot clean air resulting from solvent combustion to help bake the finish.

02427

R. L. Stenburg

CONTROL OF ATMOSPHERIC EMISSIONS FROM PAINT AND VARNISH MANUFACTURING OPERATIONS. Public Health Service, Cincinnati, Ohio, Div. of Air Pollution (Technical Rept. No. A58-4) 33 pp., June 1958. Also published in Paint Varnish Prod. 49, 61-5, Sept. 1959 and Paint Varnish Prod. 49, 111-4, Oct. 1959.

Air pollution problems associated with the manufacture of protective coatings result primarily from the high temperature processing of natural and synthetic oils and resins to produce paint and varnish vehicles. The release of malodorous materials is the most widespread problem and the most difficult to control. Since fume components are predominantly of hydrocarbon compositions, they have the potential to contribute to the formation of smog in those areas where air pollution is well established. Property damage is also a definite possibility from some of the processes employed. The majority of fumes from cooking processes may be controlled by liquid scrubbing or by incineration, the latter being more effective in reducing the small but offensive portion of the total fume output that is largely responsible for the odor problem. Activated carbon adsorption is effective on certain highly odorous materials in processes other than cooking. These and other types of controls are in general usage throughout the industry and are serving to greatly reduce the amount of undesirable materials discharged to the atmosphere. (Author summary)

03762

Spencer, E. F., Jr. N. Kayne, M. F. LeDue and J. H. Elliott

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS (INTERIM REPT. NO. 2). Los Angeles County Air Pollution Control District, Calif. Jan. 1959. 40 pp.

This report discusses the equipment and procedures used in the evaluation of control equipment for solvent vapors from surface coating processes. A pilot plant which was used to recover organic solvents by means of activated carbon is described. Of the control methods evaluated, adsorption with activated carbon offers the greatest promise. The advantages of the activated carbon system are: (1) recovers solvent vapors in all concentrations below the flammable range; (2) recovers all types of volatile solvents; (3) recovers solvents efficiently in the presence of water vapor; (4) recovers solvent vapors with high overall efficiency; (5) operation of the equipment is simple; (6) the equipment is sufficiently flexible for all types of surface coating operations. Five complete adsorption-desorption cycles were completed. The adsorption efficiency before reaching saturation averaged 92 percent, while the desorption efficiency, based on solvent recovery vs. solvent adsorbed during the individual run, averaged 57 percent. Poor steam distribution is believed responsible for the incomplete desorption and the equipment is being modified to improve the stripping of the carbon. It is planned to investigate another fixed bed unit and one moving bed unit.

03763

E. F. Spencer, Jr., N. Kayne, M. F. LeDuc, and J. H. Elliott

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS. Los Angeles County Air Pollution Control District, Calif. July 1959. 37 pp.

This report discusses the progress made in an experimental program designed to determine the degree to which the emission of solvent vapors from surface coating spraying operations can be controlled by adsorption with activated carbon. Twenty-two runs have been made to date with single solvents and multi-component solvent mixtures, representative of industrial formulations. The experimental work has shown that the control of organic emissions from surface coating operations by adsorption with activated carbon is technically feasible. Single solvents or combinations of solvents in low concentrations are adsorbed with high overall efficiency. Solvents immiscible with water are recovered with high efficiency. The desorption of mineral spirits appears to be the most formidable economic factor as the required desorption temperature is high and the value of the recovered solvent is low. A small experimental test oven to investigate surface coating oven emissions has been installed. Various surface coatings and resin products will be processed.

03966

M. J. Boldue, R. K. Severes, and G. L. Brewer

TEST PROCEDURES FOR EVALUATION OF INDUSTRIAL FUME CONVERTERS (SAMPLING AND ANALYTICAL TECHNIQUES REVIEWED FOR). Air Eng. 8, (2) 20-3, Feb. 1966. (Presented at the 58th Annual Meeting, Air Pollution Control Association, Toronto, Canada, June 20-24, 1965.)

The purpose for development of the source testing outline was to permit systematic evaluation of air pollution control equipment on gaseous organic fume streams. Data were obtained to fulfill the following objectives of the source outline: (1) Determination of combustible emission and conversion efficiency. (2) Determination of particulate matter emissions. (3) Identification of specific emissions by laboratory analyses. (4) Determination of the odor concentration of the effluent stream in conjunction with these objectives of source test measurements, the outlined program was to include: (5) A method to check credibility of sampling and analyses. (6) A technique for future monitoring of the control equipment performance. Source tests were conducted on catalytic fume converter units located on a metal-coating oven, a varnish-cooking kettle, a phthalic anhydride plant and a wire-coating oven. Sampling procedures, analytical techniques and developed equipment are discussed. The results of each of the evaluations of the catalytic fume converters are presented.

05173

E. F. Spencer, N. Kayne, M. F. LeDuc, and J. H. Elliott

AN EVALUATION OF METHODS FOR CONTROLLING ORGANIC EMISSIONS FROM PROTECTIVE COATING AND SPRAYING OPERATIONS. Los Angeles County Air Pollution Control District, Calif. July 1, 1958. 51 pp.

The results are presented of a search and evaluation of literature bearing on possible means of controlling solvent emissions from surface coating operations. In evaluating any method of solvent recovery it must first be considered if its characteristics will permit safe operation. Other important criteria by which a recovery process must be evaluated are: recovery efficiency, recovery expense, flexibility to meet varied operating conditions, and relation between initial cost and saving. All of the solvent recovery processes known so far made use of one or more of the following operations: condensation by cooling or compression, adsorption, and absorption. The recovered solvent may be contaminated with water and distillation may be necessary if the solvent is water soluble. Of the control methods evaluated, adsorption with activated carbon offers the greatest promise. The advantages of the activated carbon system are: (1) recovery of solvent vapors in all concentrations below the flammable range, (2) recovery of all types of volatile solvents, (3) the recovery expense is sufficiently low that the equipment cost may be amortized from the solvent savings, (4) recovery of solvents efficiently in the presence of water vapor, (5) recovery of solvent vapors with high overall efficiency, (6) operation of the equipment is simple, and (7) the equipment is sufficiently flexible for all types of surface coating operations.

05316

CONTROL OF ORGANIC SOLVENT EMISSIONS INTO ATMOSPHERE (SECOND INTERIM REPT. APR. 1-NOV. 30, 1966). Aerospace Industries Assoc. of America, Washington, D. C., Rept. MC-11(66)-2, 159p., 1966.

This second interim report discusses the progress of Ad Hoc Subcommittee MC-11, formed in August 1965 by the Aerospace Industries Association (AIA) Manufacturing Committee. The subcommittee was organized to investigate the effects that would result from adoption of Rule 66 of the Los Angeles County Air Pollution Control District (APCD). The APCD drafted the rule after 9 years of testing various solvents and solvent vapors that react photochemically with ozone and nitrous oxides to produce eye-irritating smog. Combined effort of industrial associations led to a new series of experiments to form a basis for technical evaluations. Other negotiations covered the definition of terms, and the proof of performance criteria methods. (Results of the joint negotiations and tests are presented in various sections of the present report.) The AIA activity was devoted to 4 basic areas of application; Protective coatings, solvents, and thinner; Cleaning and degreasing; Chemical milling and strippable coatings; Plastics and adhesives. The inventigation indicated that the solvents tested can be classified as follows in order of decreasing reactivity; Xylenes and heavy aromatics; isophorone; Toluene; Methyl isobutyl ketone; Trichlorethylene; Naphthenes; Mineral spirits; VM and P naphtha; Stoddard solvent; Isoparaffin mixtures; and n-Paraffin mixtures. In its final form, Rule 66 was substantially changed in many areas. Aerospace industries in the Los Angeles area now have a concise rule covering the allowable emissions of organic solvents into the atmosphere. As a result of the close working relationship between industry and APCD personnel, Rule 66 represents the most practicable and achievable one for reduction in the amount of solvents entering the atmosphere and contributing to smog.

05648

J. H. Elliott, N. Kayne, and M. F. LeDuc

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS (INTERIM REPT. NO. 7). Los Angeles County Air Pollution Control District, Calif. Jan. 1961. 26 pp.

The progress made on the experimental program for the control of solvent emissions from surface coating operations is reported. The results of 16 runs made with two industrial finishes, an air dry lacquer and a high temperature baking enamel, are discussed with respect to particulate matter removal before the air stream enters the carbon unit. Various filters and combinations of filters were used in this study. Additional runs were made using single and mixed solvents with the four-tray adsorber. The results are analyzed with respect to the effect of using saturated versus superheated steam on the retentivity of the carbon for these solvents. Carbon life, pressure drop, and temperature rise for the four-tray absorber are also discussed. The status of the program, together with the questions that have been answered, and the questions to be answered, are delineated. A modification of the first conical unit adsorber is described. The experimental work on this modified unit, now under construction, will conclude the work on the spray booth phase of this project.

05678

Elliott, J. H. Kayne, N. and LeDuc, M. F.

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS (INTERIM REPT. NO. 6).Los Angeles County Air Pollution Control District, Calif. July 1960. 19 pp.

The progress made on the experimental program for the control of solvent emissions from surface coating operations is reported. The results of 38 runs made with single solvents and solvent mixtures, using a four-tray activated carbon adsorber, are discussed and compared with the solvent runs made with a conical bed adsorber. An air distribution problem which developed in the four-tray adsorber and the solution of the problem are described. The work on external desorption is an autoclave, using indirect and direct heating with saturated and superheated steam, is also discussed. A continuous feed system for the paint bake oven has been designed and constructed. Some experiment runs with the oven and afterburner have been made in order to develop operational procedures. Problems arose in the analytical methods. These are discussed together with their solutions. (Authors0 abstract)

06006

Chass, R. L., C. V. Kanter, and J. H. Elliott

CONTRIBUTION OF SOLVENTS TO AIR POLLUTION AND METHODS FOR CONTROLLING THEIR EMISSIONS. J. Air Pollution Control Assoc., 13(2):64-72, 96, Feb. 1963. (Presented at the 55th Annual Meeting, Air Pollution Control Assoc., Chicago, Ill., May 20-24, 1962.)

A breakdown of the emissions of organic solvent vapors by category of industry in Los Angeles County shows that aircraft manufacturing, dry cleaning, automobile assembling, rubber production, toto-gravure printing, and furniture manufacturing are the major categories of industry responsible for approximately 30% of the total. No one industry contributes more than 8% of the total. Solvent usage contributes about 17% of all aliphatic and aromatic hydrocarbon vapors and about 70% of other emissions of origin. Application of oil-based surface coatings in all industrial, commercial and domestic activities accounts for about 55% of the total emissions from organic solvent usage. This paper summarizes the total organic emissions from solvent uses entering the Los Angeles County atmosphere each day and presents the results of an engineering development program conducted by the Los Angeles County APCD to determine the engineering and economic feasibility of controlling solvent emissions from protective coatings operations. Uncontrolled operations involve 95% of the solvent usage in the Los Angeles County. The control of solvent emissions can theoretically be accomplished by one or more of the following processes: condensation by cooling or compression, absorption, chemical modification including incineration, and adsorption. Control or recovery of organic vapors by adsorption appeared to be the most feasible approach for the low concentrations involved and was therefore selected for the experimental work. Activated carbon proved to be effective and economically feasible for the control of solvent vapors from spray finishing operations. The operational costs, including maintenance expense, and installed costs for each of the systems were estimated.

06088

J. L. Mills, W. F. Hammond, R. C. Adrian

DESIGN OF AFTERBURNERS FOR VARNISH COOKERS. J. Air Pollution Control Assoc. 10 (2), 161-8 (Apr. 1960). (Presented at the 52nd Annual Meeting, Air Pollution Control Association, Los Angeles, Calif., June 21-26, 1959.)

The airborne discharge from varnish cookers is particularly difficult to control because it consists of varying mixtures of solid particles, liquid droplets, condensable vapors and volatile vapors. Two most widely used methods of control, scrubbing and combustion, leave the odor problem unsolved. This report concerns the design characteristics of direct-fired afterburners which were constructed to destroy these air contaminants produced during varnish cooking. Results show that the pollution problems from oil bodying and varnish cooking in batch type vessels can be adequately and economically solved by direct incineration of the combined particulate and gaseous pollutants. In designing a control system, the following items should be considered: 1. Hooding. Hoods should be tight-fitting to assure adequate mist capture with minimum airflow. Ease of cleaning is a critical consideration because of the danger of batch spoilage from dripping condensate. 2. Duct work. Ducts should be sloped away from the hoods and spots should be eliminated or provided with drainage. 3. Flashback protection and precleaning. A water spray leg is recommended for precleaning and flashback protection. 4. Afterburner. The afterburner should be designed for a minimum gas temperature of 1200 F with a capability of being operated at 1400 F and should provide for intimate mixing of the gas stream with a luminous flame. The combustion chamber should be refractory-lined and should provide for a residence time of 0.5 second. The velocity of the gases through the chamber should not be less than 15 fps. 5. Controls. Burner controls should be of the modulating type to insure continuous and uninterrupted flame coverage in the combustion chamber.

06366

David M. Benforado, Joseph Waitkus

FUME CONTROL IN WIRE ENAMELING BY DIRECT-FLAME INCINERATION. J. Air Pollution Control Assoc., 18(1):24-26, Jan. 1968. (Presented at the 60th Annual Meeting, Air Pollution Control Association, Cleveland, Ohio, June 11-16, 1967.)

The results of source tests to demonstrate the applicability of direct-flame incineration for the control of the effluent from a wire-enameling bake oven are presented. The tests were conducted with a portable direct-flame incinerator under actual plant conditions. The efficiency of direct-flame incineration was established at incineration temperatures of 1000, 1200, and 1400 deg F. Evaluation of incineration efficiency was performed by both analysis and quantitative odor measurement using an odor panel. (Authors' abstract)

07242

THE ANNUAL REPORT FOR 1964 OF THE SUPERVISING OFFICES FOR TRADE AND INDUSTRY. Aus dem Jahresbericht 1964 der Gewerbeaufsicht. Reinhaltung der Luft in Nordrhein-Westfalen. (2), 19-38 (1965) Ger.

In 1964, the supervising offices for trade and industry (Gewerbeaufsichtsamter) in North-Rhine-Westfalia dealt with 10,262 cases where air pollution problems were involved. Tables present some statistics as to the actions taken in each case. Although the capacity of steam boiler plants had doubled in 10 years, the dust emission dropped by 34%. Many small waste burners had to be shut down since they could not meet standard emission limits. The output of cement kilns rose 250% from 1950 to 1964. In the same time dust emission dropped to 28% of its original value. Both dry and wet electrofilters are mostly used. Photographs of chimneys in operation document the favorable results. Dust emission from brick works was greatly reduced by replacement of tunnel furnaces with ring furnaces. Similar results are true for earthenware factories. Measures for reducing the brown smoke of steel converters are reported. Dust emission control for cupola furnaces is still in its beginning stage. Costs of various methods of dust removal are estimated; some preliminary results are reported. Electroplating plants remove acid fumes by spraying with neutralizing solutions. Methods of air pollution control in the chemical industry, nonferrous metal industry, petroleum industry, paint factories, and some other selected industries are also briefly mentioned. Comments on current air pollution legislation conclude this report.

07362

Feist, H. J.

ELIMINATING ODORS BY CATALYTIC COMBUSTION. ((Die Geruchsbeseitigung durch katalytische Verbrennung.)) Text in German. Stadtehygiene (Uelzen/Hamburg), 16(3):55-61, Mar. 1965. 11 refs.

With the rapid growth of the chemical industry, air pollution by odors has also increased. Catalytic oxidation and reduction offer possibilities for an economic solution of the problem. The principles of catalytic reactions are described. In a table the properties of four catalysts are compared with each other. These catalysts are: platinum on metal, platinum-palladium on ceramics, copper-chromium on aluminum oxide, and platinum on ceramics. The effectiveness of a catalyst depends on the gas mixture, the temperature, the type of catalyst, and the ratio: volume of gas/hour/volume of catalyst. The heat generated by the catalytic process is usually used to preheat the gas before it enters the catalyst. If the concentration of combustible substances is sufficient, steam may be produced in addition. An example is quoted where 47,000 cu. m. gas per hour with a latent heat of 400 kcal/cu. m. produce 31 tons of steam per hour. The equipment pays for itself in 2 1/4 years. For gases of low heat content, catalytic combustion under increased pressure is advantageous. Most economical is a gas turbine which compresses the gas and, after it has passed the catalytic chamber, uses the hot cleaned gas. The use of a gas turbine is recommended for gas volumes of more than 100,000 cu. m./hr, if measures for air pollution control become necessary.

07836

Benforado, David M.

AIR POLLUTION CONTROL BY DIRECT FLAME INCINERATION IN THE PAINT INDUSTRY. J. Paint Technol., 39(508):265-266, May 1967. 1 ref. (Presented at the 44th Annual Meeting, Federation of Societies for Paint Technology, Washington, D. C., Nov. 4, 1966.)

Direct-flame incineration is discussed and up-to-date information available is summarized. Direct-flame incineration is an air pollution control process in which objectionable organic vapors or organic particulates are converted to harmless carbon dioxide and water vapor. The organic emissions are destroyed by exposure under the proper conditions to temperatures of 1000-1400 deg. F in the presence of a flame. Heat recovery equipment to cut down fuel costs is usually easily justified. A typical forced draft direct-flame incineration system with heat recovery showing how solvent vapors are eliminated from a can coating process is presented. Compared with other control processes for organic emissions, direct flame incineration is capable of achieving a high level of effectiveness. The basic variables affecting the design of a direct-flame incinerator are: (1) Incineration temperature; (2) The length of time the contaminated air is held at this temperature; and (3) The amount of turbulence or mixing designed into the combustor. Applications in which direct-flame incineration has been used successfully by paint manufacturers include controlling the exhaust from: resin and varnish cookers; and phthalic anhydride plants. Applications in which direct-flame incineration has been successfully used by industrial finishers include control of emissions from bake ovens such as automobile can coating, sheet metal, and wire enameling.

08345

Cooper, Jonathan C. and Frank T. Cunniff

CONTROL OF SOLVENT EMISSIONS. Proc. MECAR Symp., New Developments in Air Pollution Control, Metropolitan Engineers Council on Air Resources, New York City, p. 30-41, Oct. 23, 1967.

Four different approaches can be taken toward controlling solvent vapor emissions from industrial and commercial operations. One way is to avoid air pollution entirely by using water as the solvent. A second approach is to reduce the severity of the pollution by changing to organic solvents with low photochemical reactivity. A third control method is to destroy the escaping solvent vapors by incineration. When properly designed and installed this method is very effective and the capital costs involved are moderate. The fourth type of control method is to capture the emitted solvent vapors so that the solvent can be recovered for reuse. Three techniques are available - adsorption of the vapors in a scrubbing liquid, condensation by cooling, and adsorption on activated carbon. Of these, activated carbon adsorption is the most generally applicable and is capable of achieving the highest degree of solvent recovery, with resulting attractive payout.

08351

Benforado, David

CONTROL BY INCINERATION. Proc. MECAR Symp., New Developments in Air Pollution Control, Metropolitan Engineers Council on Air Resources, New York City, p. 99-109, Oct. 23, 1967. 3 refs.

Recent developments in the control of solvent emissions by incineration are reviewed. There are two methods of incineration available for consideration - direct-flame incineration and catalytic-type incineration. In direct-flame incineration, the organic emissions are destroyed by exposure under the proper conditions to temperatures of 1000 deg to 1400 deg F., in the presence of a flame. In catalytic-type incineration, the presence of the catalyst allows the oxidation process to proceed at a lower temperature and in the absence of a flame. Experience has shown that direct-flame incineration systems can operate continuously at efficiencies of 90 plus %. Efficiency capabilities of 85 to 92% have been reported for properly maintained catalyst systems. When Rule 66 was passed in Los Angeles it stated that, if incineration is to be used, the control system must have an efficiency of not lower than 90%. Incineration equipment installed in Los Angeles to comply with Rule 66 will be direct flame systems because of the compliance schedule requirements. Burner development, design criteria, information required by equipment manufacturers, and measurement of effectiveness of equipment are also discussed.

08506

EXPLORING THE APPLICABILITY OF DIRECT-FLAME INCINERATION TO WIRE ENAMELING FUME CONTROL. Wire Prod., 42(11):1981-1988, Nov. 1968. (Presented at the Electrical Conductor Division of the Wire Association, Chicago, Ill., Oct. 23, 1968.)

To test the applicability of direct-flame incineration to control fumes emitted in the wire enameling process, a portable direct-flame incinerator was used. The effectiveness of the incineration of objectionable fumes at temperatures of 1,400, 1,200 and 1,000 + deg. F. was investigated by chemical and instrument analysis of phenolic compounds, heavy hydrocarbons and light gaseous hydrocarbons as well as by a quantitative odor measurement, using an odor panel. A description and schematic diagram of the portable incinerator unit is provided. Tabulated data include summaries of operating conditions, of the analysis and of odor panel tests. The test program showed that excellent cleanup of the exhaust from a wire-enameling oven could be achieved with direct-flame inciner- ation. On the basis of test data analysis it was concluded that an efficiency of 90% (based on p.p.m. by weight reduction of contaminant) could be achieved at an incineration temperature of 1,350 + deg. F. with residence time of one-half second when using a nozzle-mix burner in a properly designed combustor. As a result of an engineering study to establish the most practical physical arrangement of a direct-flame incineration system that could fulfill the requirements of a typical wire enameling plant, a system was developed for a battery of enameling towers which is highly efficient and includes a waste heat recovery feature to make it more economical.

08635

Crouse, Lowell F., and Donald E. Waid

EFFICIENT DESIGN OF AFTER BURNERS FOR INCINERATION OF MANY INDUSTRIAL FUMES. Air. Eng., 9(8):20-29, Aug. 1967.

The performance of a tunnel type burner and of a combustifume The performance of a tunnel type burner and of a combustifume burner for the incineration of organic solvent fumes were compared. The concentrations of unburned hydrocarbons in industrial oven effluents were determined with the flame ionization hydrocarbon analyzer. From a plot of the results the combustifume burner eliminated the same amount of hydrocarbons at a lower temperature than the tunnel type burner. For example, at 1450 deg. F the concentration of hydrocarbons at the tunnel type burner outlet was 30 ppm while the combustifume burner attained this degree of cleanliness at 1130 deg F. Reasons for this considerable difference in reaction temperature include: (1) the variation in temperature across the combustion chamber (greater variations using the single tunnel-type burner), (2) the great difference in flame exposure to all the effluent, and (3) the dwell time at temperature is longer in a given combustion chamber when using the very short- flame line burner instead of the tunnel-burner type. Various other designs of the tunnel-type burner and combustifume burner are also illustrated and discussed.

09110

Ingels, Raymond M.

THE AFTERBURNER ROUTE TO POLLUTION CONTROL. Air Eng., 6(6):39-42, June 1964. 8 refs.

Thermal calculations are discussed which are required in designing afterburners to control air pollution from industrial processes. Factors considered in the calculations are (1) the gross heating value, (2) combustion products, (3) the correction of the heating value (dry) to heat available with combustion products at 1200 F (water as vapor), (4) a correction for less than theoretical air used as primary air, (5) heat required to heat 300 scfm of contaminated air from 200 F to 1200 F, (6) natural gas required, (7) the volume and velocity of discharge gases, and (8) the required combustion chamber length for a 0.3 second residence time. The results suggest that (a) 454 cfh of natural gas is required; (b) a 13-in. ID combustion chamber should be used to give a discharge velocity of 21.4 ft/sec, and (c) a 6.4-ft long combustion chamber is required for a residence time of 0.3 second.

09791

Dey, Howard F.

AFTERBURNERS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 171-187, 1967. GPO: 806-614-30

Specifications and design parameters, the operation, applications, and efficiency of direct-fired and catalytic afterburners are discussed. Examples showing calculations of some factors considered in the design of a direct-fired afterburner to be installed in a meat smokehouse and a catalytic afterburner to be installed to eliminate odor from a direct-fired process oven are illustrated. Results of stack emissions from several direct-fired and catalytic afterburners are also outlined. The process equipment and the afterburner used in each case are briefly described. A survey of installation cost of direct-fired and catalytic afterburners reveals a general range from 5 to 10 dollars per scfm contaminated gas.

09818

Weiss, Sanford M.

SURFACE-COATING OPERATIONS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 387-390, 1967. GPO: 806-614-30

Basic coating operations include dipping, spraying, flowcoating, and roller coating. Each operation is described. Air pollution problems, hooding and ventilation requirements, and control equipment are discussed. The discharge from a paint spray booth consists of particulate matter and organic-solvent vapors. Air contaminants from paint dipping, flowcoating, and roller coating exist only in the form of organic-solvent vapors since no particulate matter is formed. The usual spray booth ventilation rate is 100 to 150 fpm per square foot of booth opening. Insurance standards require that the enclosure for spraying operations be designed and maintained so that the average velocity over the face of the booth, during spraying operations, is not less than 100 fpm. Dip tanks, flowcoaters, and roller coaters are frequently operated without hoods. When local ventilation at the unit is desirable, a canopy hood may be installed. Particulate matter in paint spray booths is controlled by baffle plates, filter pads, or water spray curtains. Known solvent recovery processes make us [illegible] condensation, compression, absorption, distillation, or adsorption principles. In view of the small solvent vapor concentration in the airstream from the spray booth or applicator hood, the only economically feasible solvent control method is adsorption. Recent work indicates that adsorption by activated carbon can be a feasible method for the control of paint solvents. This work indicates that control efficiencies of 90 percent or greater are possible, provided particulates are removed from the contaminated airstream by filtration before the airstream enters the carbon bed.

09819

Chatfield, Harry E.

PIPE-COATING EQUIPMENT. In: Air Pollution Engineering Manual. (Air Pollution Control District, Coutny of Los Aneles.) John A. Danielson ncomp. and ed.). Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 390-393, 1967. GPO: 806-614-30

Asphalt and coal for enamel is applied to pipes on order to exclude corrosive elements from contacting the metals. The three usual methods of applying asphalt or coal coatings are dipping, wrapping and spinning. Each application method is described. The largest source of air pollution from asphalt or coal tar operations is the dense white emissions caused by vaporation and subsequent condensation of volatile components in the enamel. This cloud is composed of minute oil droplet. These emissions are objectionable on three counts that include opacity, odor, and toxicity--those from coal tar being the more objectionable. Because of the nature of all three of the methods used to apply asphalt and coal tar enamels to pipe, collection of the contaminants is difficult. One solution is to install a stationary hood at the end of the pipe where the lance is inserted. A portable fan or blower is used at the other end to blow air through the pipe, conveying the emissions to the hood at the other end. Another solution of the fume collection problem is to house all the equipment and vent the building to the air pollution control system selected. This method may not be necessary for an isolated spinner or wrapper, but a dipping process or a process using several coating operations, it is more satisfactory than using local exhaust systems. Three basic types of devices can be considered for control of the emissions from asphalt and coal tar application. These are (1) scrubbers, (2) incinerators (afterburner), and (3) electrical precipitators. Water scrubbers have been used most frequently. Incineration is the most positive method of complete control, but economic factors practically eliminate its application. The high initial cost of electrical precipitators as compared with that of scrubber systems, has also made them unattractive.

09844

Chatfield, Harry E.

RESIN KETTLES. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 681-688, 1967. GPO: 806-614-30

Aspects of resin (plastic) production such as chemical reactions, reaction conditions, equipment, and operating procedures are discussed for phenolic, amino, polyester, and alkyd, polyurethane, polyvinyl, polystyrene, and petroleum and coal tar plastics. The principal air contaminants and sources of emission from resin manufacturing operations are tabulated. The usual emission control equipment types are cyclones and spray towers for particulates, and reflux condensers and water scrubbers for solvent fumes.

09845

Chatfield, Harry E.

VARNISH COOKERS. In: Air Pollution Control Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 688-695, 1967. GPO: 806-614-30

Varnish is a homogeneous, heat-processed blend of drying oil, resin, drier, and solvent. The ingredients are mixed in a heated bottle from 8 to 12 hours at temperatures from 200 deg. to 600 deg. F. Emissions average 3 to 6 percent of the batch and include water vapor, fatty acids, glycerine, acrolein, phenols, aldehydes, ketones, terpene oils, terpenes, and carbon dioxide. Exhaust hoods placed over the kettles lead to such emission control equipment as water scrubbers, activated charcoal adsorbers, and flame and catalytic afterburners. Proper design, operating conditions, effectiveness, and limitations are discussed for hoods and each type of emission control equipment.

09848

Verssen, Julien A.

PAINT-BAKING OVENS. In: Air Pollution Engineering Manual. (Air Pollution Control District, County of Los Angeles.) John A. Danielson (comp. and ed.), Public Health Service, Cincinnati, Ohio, National Center for Air Pollution Control, PHS-Pub-999-AP-40, p. 704-716, 1967. GPO: 806-614-30

Ovens, directly or indirectly fired, are used to dry, harden, and remove solvents from such surface coatings as paint, varnish, lacquer, resin, ink, enamel, and shellac. The general design of such ovens and specific standards of the fire underwriters are discussed in light of the lower explosive limit of solvent vapors. Smoke emission from the heaters can be controlled by proper choice of burners and fuel. Vapors from the drying process, such as aliphatic and aromatic hydrocarbons, ketones, alcohols and glycols, ethers, and esters can be controlled by incineration in a direct- flame afterburner. Catalytic afterburners have been found to be unsatisfactory. Tables of organic solvents, efficiencies of catalytic and flame afterburners in control of emissions, and costs of various sizes of flame afterburners are presented. Quantitative design procedures for a baking oven are demonstrated.

10950

Benforado, D. M.

CONTROL OF AIR POLLUTANTS IN THE FINISHING INDUSTRIES. PART I. FIVE METHODS OF CONTROLLING ORGANIC EMISSIONS FROM PAINTING AND BAKING OPERATIONS IN FINISHING PLANTS. Ind. Finishing (Indianapolis), 44(7):24-27, June 1968.

Organic emissions from the multitude of painting and baking operations employed in metal finishing can be reduced or suitably controlled by a variety of methods. The five methods considered in this brief survey are: modification of equipment, reformulation of solvents, adsorption, absorption, and incineration.

10951

Benforado, David M

CONTROL OF AIR POLLUTANTS IN THE FINISHING INDUSTRIES. TWO-PART REPORT/PART II. Ind. Finishing (Indianapolis), 44(8):48-52, July 1968. 3 refs.

In catalytic-type incineration the presence of a catalyst allows the oxidation process to proceed at a lower temperature and in the absence of a flame. Incineration temperatures reported for satisfactory operation of catalyst systems range from 600 to 1000 F. If incineration temperatures of 800-1000 F are required, the application of heat recovery equipment should be considered. Preheat temperature and space velocity through the bed of the catalyst are important variables affecting efficiency while another consideration in the selection of catalytic systems is the possible presence of poisons, suppressants, or fouling agents in the exhaust stream. Typical contaminants for the platinum family catalysts are listed. In direct-flame incineration the organic emissions are destroyed by exposure under the proper conditions to temperatures of 1000-1400 F, in the presence of a flame. The basic variables affecting the design of a direct-flame incinerator are incineration temperature, the length of time the contaminated air is held at this temperature, and the amount of turbulence or mixing designed into the combustor. Heat recovery equipment to cut down fuel costs is usually justified. Direct-flame fume incineration systems have been installed on automobile paint bake ovens. After the equipment is installed, fume control effectiveness should be measured analytically by chemical or instrument analysis, or subjectively by use of an odor panel.

12152

Elliott, Jack H., Norman Kayne, and Mark F. Le Duc

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS. (FINAL REPORT). Rept. no. 8, Los Angeles County Air Pollution Control District, Calif., 147p., June 1962.

This report concludes an investigation into the feasibility of controlling organic vapors released into the atmosphere from surface coating operations. The effectiveness of activated carbon for controlling organic vapor emissions in commercial and industrial spraying operations where concentrations range from 100 to 200 ppm is evaluated. Capital and operating costs for facilities with exhaust volumes of 1000 to 50,000 cu ft per min are estimated. Previously reported findings regarding approaches to control, results of pilot operations of activated carbon adsorption units, and the development of analytical methods are also summarized. Technical feasibility of adsorption methods was demonstrated; 90% of the organic emission from a single source was recoverable. One batch of activated carbon was used for 1928 hours without apparent decline in adsorptive qualities or changes in size or appearance. The use of filters to properly prevent contamination by solid particulate matter in the over-spray of the coating operation could extend the adsorption life considerably. The value of recovered solvent is sufficient to cover operating costs of only the larger units. The analytic method developed is satisfactory for source testing and for determining compliance or non-compliance with proposed control regulations.

13079

Bethune, W. J. and Lance J. Foord

FUME ABATERS CLEAN EXHAUST FROM WIRE ENAMEL CURING OVENS. Wire Wire Prod., 44(7):50,94, July 1969.

Catalytic oxidation systems, installed on two wire enamel curing ovens at the Canadian General Electric Co., clean phenols and other residual solvent contaminants from oven exhaust air. This system uses no water. The gaseous pollutants are burned while the exhaust remains in a vaporous state in the air exhaust stream. The combustion occurs as the preheated stream passes through a catalyst-coated honeycomb bed housed in a steel chamber erected above the oven. Formerly, the ovens had to be shut down every six weeks while the water scrubbers were cleaned. The maintenance of the catalytic beds has been minimal and operation can now be continuous. Another advantage of the catalytic system is the air turbulence created by the process fan which draws the exhaust fumes from the oven and the combustion fans which mix the preheated air stream with the fumes. This turbulence, along with the controlled heat levels achieved by catalytic reaction, keeps the exhaust fumes in gaseous form, preventing a buildup of oils, resins, and other condensates in the oven exhaust vents and stacks.

16316

Nu-way Eclipse Ltd., England, Technical Engineering Staff

INCINERATION OF EFFLUENT VAPORS. Metal Finishing J. (London), 15(180):434-436, Dec. 1969.

Direct-flame fume incinerators should meet the most stringent regulations for the control of solvent emissions from processes, such as paint drying and stoving, printing, lithographing, curing, and polymerizing. In these units, organic pollutants are passed through a combustion chamber, raised to self-ignition temperature by contact with the direct flame, and oxidized to carbon dioxide and water. The temperature to which effluent gases must be raised for the combustion reaction to produce a sufficiently pure gas will vary according to type of pollutant, percentage of exhaust pollutant allowed, and the degree to which effluent and flame are mixed in combustion. In general, exhaust-gas discharge temperatures of 1200-1400 C reduce pollution in effluent by 85-95%. The discharge to the atmosphere is odor-free. The fume-elimination process cannot be used with certain degreasing solvents such as halogenated organic compounds.

16326

Acres, G. J. K.

PLATINUM CATALYSTS FOR THE CONTROL OF AIR POLLUTION. Platinum Metals Rev., 14(1):2-10, Jan. 1970. 5 refs.

A new platinized ceramic honeycomb catalyst marks a major advance in the use of catalysts for controlling gaseous organic pollutants. The thin wall honeycomb structures have a high surface-to-volume ratio which makes them as good or better than pelleted catalysts. The honeycomb supports also have a high thermal shock resistance and structural strength; unlike pelleted catalysts, they are attrition resistant. The catalyst is stable in either oxidizing or reducing conditions up to 750 C. Homogeneous distribution of the platinum in the honeycomb structure is obtained by impregnating the support with aqueous chloroplatinic acid followed by a gas phase reduction in hydrogen. The ignition temperatures on the catalyst for a wide range of molecules often encountered in polluted air are tabulated. On the catalyst, the temperature required for conversions higher than 90% is usually 50-100 C higher than the ignition temperature. When the temperature is above that required for ignition, the catalyst can be placed directly in the gas stream. Examples of this use are wire-enamelling ovens, some paint-drying ovens, self-cleaning cookers, and diesel or internal engine combustion systems.

16890

Ellis, William H., Zoltan Saary, and David G. Lesnini

FORMULATION OF EXEMPT REPLACEMENTS FOR AROMATIC SOLVENTS. J. Paint Technol., 41(531):249-258, April 1969. 16 refs.

Air pollution legislation in California, in effect, requires that aromatic solvents be replaced with exempt materials. Oxygenated solvents in combination with low-aromatic hydrocarbon thinners are being used to replace the restricted aromatics. Solvency and evaporation rate are the two key performance factors that must be considered in developing replacement solvents. Cost, odor, and toxicity are also important. The use and relationship of various tools available for developing suitable aromatic replacements are described for the guidance of the formulator. Data are given for illustration. A practical approach to reformulation is outlined. (Author's Abstract)

17293

Terabe, Mototsugu

BAD SMELLS AND COUNTERMEASURES FOR THE PUBLIS NUISANCE. (Akushuh to kohgai taisaku). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 5(12):696-702, Dec. 25, 1969. 17 refs.

Most malodorous substances are organic substances containing nitrogen or sulfur, such as amines and mercaptans. Other malodorous substances containing no nitrogen and sulfur are phenols, cresols, butyric acid, and valeric acid. Industrial plants which possibly emit malodorous substances process paints, metals, plastics, oils, fats, petroleum refinery, and gum. Unpleasant odors are one of the most complex public nuisances. Odors are generated by many kinds and small quantities of substances, and the only measuring apparatus is man's nose. Katz classified the intensities of smells into five classes: zero is no odor; one, barely perceptable; two, faint; three, easily noticed; four, strong; and five very strong. The relationship of this scale to ppm with several sulfur compounds was studied. The intensity of smell did not directly correspond to the density. When the density became ten times, the intensity becomes about double. The degree of odor, odor unit, odor concentration and odor emission rate were explained. G. Leonardos measured odor thresholds of 57 chemicals. Deodorization methods were classified into absorption, adsorption, chemical oxidation, combustion, and neutralization. Deodorization methods having practical utility were explained. The adsorption method using activated coal is useful for alchols, acetic acid, butyric acid, caprylic acid, benzene, and mercaptans. Adsorption efficiencies of activated coal were tabulated for 97 substances. Removal of hydrogen sulfide was studied by many methods. The Takahax wet method, absorption by naphtoquinone sulfonic acid was noteworthy. Organic substances are removed efficiently by direct gas flame incineration.

18050

Stresen-Reuter, James

CATALYTIC INCINERATOR CONTROLS HYDROCARBONS AND ODORS. Plant Eng., 23(8):142, April 17, 1969.

In the production of varnishes, vehicles and compounds for the paint industry and resins for the foundry industry, batch processing in heated, cooled, and agitated reactors, mixing tanks, and filtering equipment is used. Catalytic incineration has proven to be the most effective method for eliminating any odors from this type of process. A schematic drawing shows the control of fumes from the reactor through a spray tower to the catalytic incinerator.

18150

Bethune, W. J. and Lance J. Foord

ONE PLANT'S ANSWER TO AIR POLLUTION CONTROL. Prod. Finishing, p. 66-69, July 1969.

Magnetic wire for motors, generators, transformers and other electrical devices is produced by General Electric Canada, Ltd. GE applies five to seven different coatings to the wire for insulation and protective purposes. The enamel film is cured by baking in electrically heated, vertical ovens. Fumes emanating from these ovens contain solvent vapors which may cause air pollution. To combat this problem, two catalytic fume abaters are employed which oxidize the pollutants through low-temperature combustion. As catalytic combustion occurs in a honey-comb cartridge coated with a mixture of platinum and aluminum, the temperature of the vapor stream rises to about 780 F. Thermocouples in the catalytic chamber and afterburner area automatically control the preheating gas valves. The units are normally controlled automatically, but there are manual controls such as signal alarm systems which alert employees when there is a malfunction. There are several advantages to using this catalytic oxidation process, particularly in the area of heat that is generated. The heat from the exothermic reactions in the catalytic chamber may be used to heat a plant, generate power, or be fed back into the process.

20310

Price, Harold A. and Donald A. Price

AIR POLLUTANT INCINERATION. (Gas Processors, Inc., Brea, Calif.) U. S. Pat. 3,472,498. 8p., Oct. 14, 1969. 3 refs. (Appl. Dec. 8, 1967, 8 claims).

Generally, the source of industrial pollutants are incomplete combustion products from heat generating processes and the discharge of combustible solvents which have been evaporated. One of the most common applications is found in painting processes where paints are dried by baking to leave a thin film of pigment on the item being painted. An incineration system is provided for preventing the discharge into the atmosphere of oxidizable waste particles from exhaust gases of ovens. Exhaust gas is mixed with a combustible gas to a level just above the lower explosive limit for the mixture, and the heated gas discharged by the incinerator is cooled preferably by mixing it with an adequate quantity of air at ambient temperature. Thereafter a blower propells the air and gas mixture to a location where thermal energy in the mixture is required and can be utilized, while the relatively small pressure drop across the combustion chamber, together with the substantially lower temperatures of the mixture, permit a highly economical construction and operation of the blower. A preferred embodiment of this invention contemplates a division of the air-gas mixture into two streams.

21294

Bauch, Heinrich and Harry Burchard

ATTEMPTS FOR IMPROVING STRONGLY SMELLING OR TOXIC EFFLUENTS BY OZONE. (Ueber Versuche, stark riechende oder schaedliche Abwaesser mit Ozon zu verbessern). Text in German. Wasser Luft Betrieb, 14(4):134-137, 1970.

The influence of ozone on waste water from the lacquer and paint industry containing alcohols, esters, ketones, aldehydes, benzene, xylol, toluol, phenols, thioesters, chlorinated hydrocarbons, fats, and oils was studied. The waste water was subjected to preliminary treatment. The pH was reduced to between 2 and 4 with sulfuric acid; 0.05 to 0.1 g iron and/or aluminum was added. Calcium hydroxide was added until a pH of 6.5 to 8 was obtained. Most metals, organic solvents, oils, and resins were removed. The phenols, esters, alcohols, etc. were not affected by this treatment. Addition of ozone (ozonized air, or ozonized oxygen) markedly diminished the KMnO4 demand. Odors were strikingly reduced. But not all organic substances were oxidized. Acids, chlorinated hydrocarbons, pyridine, and saturated paraffins were hardly attacked by ozone. Preliminary treatment of the waste water with chlorine reduced the ozone consumption.

22988

Okuno, Toshihide

THE CHEMICAL COMPONENTS OF ODOR FROM PLASTIC PLANTS AND SOME EXAMPLES OF ODOR CONTROL. (Purasuchiku kojo yori haishutsu sareru akushu kagaku seibun oyobi sono dasshu taisaku). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 1(1):46-50, April 20, 1970. 2 refs.

Chemical change of odor bearing waste gas in the course of syntheti resin processing and some odor removal measures in practice at plastic plants are discussed. Because of the diversity in the synthetic products, odor components and organic compound residues are also different. The typical process for acrylic acid ester compounds production involves a closed reactor to prevent self-polymerization of monomers due to sunlight and oxygen, and polymerization occurs in the nitrogen stream. In this process the monomer-tank, the reactor and the storage tank are the possible sources of odor emission. Characterized by their irritating odor, acrylic acid ester compounds even with a concentration below 1 ppm can be perceived from 20 m away. Adsorption, catalytic oxidation, combustion, and chemical solvents methods can remove this odor. Some examples of odor removal by the use of chemical solvents are demonstrated. In a process where plastic paint is made of resin mixed with other synthetic materials, resin odor stimulates eyes and throat. The result of ga chromatography made on terpene gas has indicated that in a thermal treatment tall rosin was greater in terpene emission than gum rosin. Settling of terpene gas by cooling treatment can be an odor countermeasure due to the difference in the boiling point of terpene gas and resin acid. Some resin acid which is difficult to settle by cooling can be neutralized by an alkaline substance.

23967

Hardison, L. C.

GASEOUS WASTE DISPOSAL. Ind. Gas, vol. 47:16-23, July 1968. (Presented at the East Ohio Gas Co. seminar on waste disposal, Cleveland, Ohio.)

The three basic oxidation processes for incineration of waste gases are flame, thermal, and catalytic incineration. The three differ basically in the temperature to which the gas stream must be heated. Flame incinerators are most often used for closed chemical reactors; however, if the concentration of combustible contaminants in air air stream is well below the lower limit of flammability, direct thermal incineration is considerably more economical. Catalytic incineration is widely used for the oxidation of paint solvents, odors from chemical and food operations, and for other functions that help offset the cost of air pollution control equipment; it operates below the limits of flammability and below the normal oxidation temperatures of the contaminants. The catalytic systems are the least costly when comparisons are made at the optimum level of heat recovery. Details of the three methods are given, particularly in terms of the operating costs of the equipment; several applications are briefly considered, including wire enameling, metal lithography, and kettle cooking. Carbon absorption and wet scrubbing are among the alternatives for some applications where incineration is not appropriate. The general steps in choosing a gas disposal system for a particular emission are outlined.

25033

Rueb, Friedmund

AIR POLLUTION CONTROL IN INDUSTRIAL PAINT-SPRAYING PLANTS. (Luftreinhaltung in industriellen Lackierbetrieben). Text in German. Wasser Luft Betrieb, 14(9):347-353, Sept. 1970.

The construction and operation of paint spray booths and cabins with dry separators, of water-rinsed booths, of enclosed spraying and drying booths, the drawing off and reclamation of organic solvents, thermal combustion of polluted air, and its catalytic combustion are described. In dry separation, paint mists are drawn off by ventilators through labyrinth filters; wet separation where the walls of the spray booths are constantly being rinsed with water or where the mist has to pass through a screen of water produces exhaust air of higher purity and minimizes the danger of fires. Enclosed spray booths use principally for spray painting automobiles are so constructed that the operator is supplied fresh air. Paint and solvent separation is the same as in open booths. The recovery of solvents is accomplished by absorption with activated carbon whence the solvent is expelled by steam. When the emission of solvents into the atmosphere exceeds 10 kg/hr, then the German law stipulates the mandatory use of a thermal or catalytic combustion installation. The presence in the atmosphere of catalytic poisons like lead or phosphoric acid esters makes catalytic combustion inapplicable. Combustion takes place at 650-800 C. The advantage of catalytic combustion is that it operates with higher concentrations and lower temperatures.

25159

Nagrani, Ashok K.

LOCKHEED'S FILTRATION SYSTEM FOR PURIFYING PAINT EXHAUST. Filtration Eng., 1(3):28-31, Nov. 1969.

A filtration system for purifying paint exhaust is described. Faced with the problem of removing overspray from on-the-spot painting operations, Lockheed engineers studied the four feasible methods of extracting solvent vapors from an air stream: oxidizing solvent vapors by heating over a catalyst; condensing solvent vapors; adsorption by activated charcoal; and ozone injection to mask the odors. Based on these methods, a portable exhaust purification unit was designed which uses a system comprised of mechanical filters for the removal of solid paint particles, a plenum chamber to reduce the air velocity, and banks of activated charcoal filters to extract the solvent vapors. The unit is equipped to handle 6000 cu ft/min of exhaust gas. The concentratio of toxic vapors in the treated exhaust gas is checked by an electronic vapor detector, which automatically shuts off the spray-painting unit if solvent fumes are being passed. The unit is effective for about 240 hours of operation before filter replacement is necessary.

27732

Vos, A. W. D. and J. Smarsh

AUTOMOTIVE COATINGS AND POLLUTION. Preprint, Society of Automotive Engineers, Inc., New York, 4p., 1970. (Presented at the Society of Automotive Engineers, Mid-Year Meeting, Detroit, Mich., May 18-22, 1970, Paper 700466.)

Water and air pollution which result from the various processes in painting automotive sheet metal and bodies are reviewed: cleaning and phosphate coating; spray painting and treatment of spray paint sludge; electrocoating; paint 'curing' and 'baking'; wet sanding; paint stripping; and the use of sealers, deadeners, and adhesive applications. Regulations in effect in various communities affecting these processes are briefly described; these concern control of organic and particulate emissions, opacity and odor, and water treatment requirements. Current control measures being undertaken by the Ford Co. include incinerator installations to control oven emissions, undercoating, and use of electrostatic spray equipment. In addition, several promising materials are being evaluated, such as thermosetting and thermoplastic nonaqueous dispersion enamels, higher solids solution acrylic enamels, water-based enamels and primers, and powder coatings. Material and emission testing is conducted in the laboratory; in addition, tests are conducted at assembly plants to measure exhaust or stack emissions, particularly when new materials are used in production

28538

Wiebe, Herbert and Walter Gausepohl

THERMAL CLEANING OF WASTE AIR. (Thermische Abluftreiningung). Text in German. Brennstoff-Waerme-Kraft, 23(3):98-102, March 1971. 7 refs.

Combustors are particularly suitable for the thermal treatment of waste gas, but they are expensive and noisy. Fuel and air are rapidly mixed with each other. The air enters the combustion chamber not coaxially but in a rotary movement. A combustor is used to clean solvent-laden waste air from a drying station of an automobile coating plant. The waste air enters the combustor at 160 C, while the cleaned air leaves the chamber at about 800 C. It is cooled in a heat exchanger and the heat liberated used for a car body dryer. The use of a combustor in a synthetic coating plant and for cleaning the waste gases from a hardening chamber for phenol resins is also described. Measurements of the pollutant concentrations immediately behind the combustor revealed that the cleaned gases contained between 40-1000 ppm carbon monoxide, 2-15 ppm nitrogen dioxide, and 25-60 ppm ammonia.

29659

Ehrlich, Arthur and C. R. Swenson

POLLUTION REGULATIONS AND THEIR EFFECT ON VEHICLE PREPARATION. Am. Paint J., 55(44):18-24, April 19, 1971.

Cold blending of durable coatings offers many advantages over vehicle cooking both as a consequence of the enforcement of air pollution control regulations and because of certain innate product characteristics. In the first place, cold blending is more economical as a production process. No heat is needed for the desired reaction and, consequently, no varnish cooking equipment is required, only simple mixing operations. Because room temperatures are involved, the formulator eliminates the three to 10% loss in volatiles associated with cooking. In addition, low cost and low toxicity aliphatic and aromatic solvents are employed in the solubilizing operation. Vehicles based on the new oil polymer in anti-corrosive paints have better drying; toughness; durability; and chemical, alkali and water resistance than those based on linseed oil and alkyd.

29761

Smaller Enterprises Promotion Corp. (Japan)

ON PUBLIC NUISANCE BY, AND ENVIRONMENTAL HYGIENE OF, PAINT MANUFACTURING INDUSTRY. (Toryo seizogyo, kogai kankyo eisei ni tsuite). Text in Japanese. Rept. 417, p. 40-41, March 1971.

A survey was taken on public nuisances in small enterprises. In the paint manufacturing industry fire hazards received 32.9% of the complaints and guidance by the supervising governmental offices bad odors received 28.2%. Other items in the list were effluents, smoke, noise, traffic noise and danger, and dust. Enterprises with a work force of 50-99 persons headed the list with 24 cases, followed by those with 30 persons or less with 22 cases. Of the 28 cases of fire hazard grievances, 20 cases have been corrected by improving the production facilities (17 cases) and by other corrective measures (three). Eight still remain incorrected. The reasons given for the pending corrective actions were that the preventive devices and facilities cost too much (one case), or that the factory space was too limited to spare extra space for installation of the preventive devices and facilities (seven cases). Also, 22 of 24 odor grievance cases were solved by equipment improvement (16), change of blended material (two), stoppage of the production of those products causing public nuisances (six), and other measures (two). Two cases still were uncorrected due to the lack of knowledge of what to do about the solution (one), and the cost of preventive equipment (one). The devices and equipment installed to improve the working environment were shown by purpose. Of the 85 enterprises surveyed, 17 had the heating/cooling facilities, 26 the deodorizing facilities, 30 the dust-removing, 69 the ventilating, and 18 the soundproofing.

30176

Sturies, Franz

WASTE AIR FROM LACQUER PROCESSING. PROBLEMS OF CATALYTIC AND THERMAL AFTERBURNING. (Abluft bei der Lackverarbeitung. Problem der katalytischen und thermischen Nachverbrennung). Text in German. VDI (Ver. Deut. Ingr.) Nachr. (Berlin), 25(22):19, June 2, 1971.

Cleaned waste gases of lacquer-processing plants may not contain more than 300 mg/cu m carbon in the combustible organic matter. There is scarcely any knowledge about the composition of waste gas emitted from drying furnaces. The sensitivity of available test tubes is below the odor threshold, but they are suitable only for measurements between 0 and 40 C. To achieve the necessary cooling of gases with temperatures of 300 C and more, copper tubes 600-mm long can be used. These tubes are 5-mm in diameter and have a wall thickness of 1 mm. Such waste gases can be cleaned by catalytic combustion between 300 and 500 C and thermal afterburning between 500 and 900 C. Experiments show that at a waste gas carbon content of 500-700 mg/cu m, thermal combustion with efficiency of 60-70% is sufficient. If the carbon content of the waste gas is between 2700-3000 mg/cu m, a combination of thermal and catalytic afterburning is preferable. In cases where the catalysts are rapidly contaminated by phosphorus compounds contained in the lacquers, thermal afterburning must be used. Installation costs for a combined thermal catalytic/afterburning system range from $8400-9800.

30229

PURIFICATION OF WASTE GASES IN THE PAINT INDUSTRY. (Avgasrening vid lackering). Text in Swedish. Koy, vol. 4:30-31, 1971.

Waste gases from paint factories contain such impurities as lead, zinc, manganese, phosphorus, and large quantities of vaporized and cracked solvents. The most effective purification methods involve the oxidation of the waste gases, other methods, such as use of scrubbers, are not applicable. Two basic types of oxidation are used: catalytic and thermal. Catalytic afterburners operate in the temperature range of 250-400 C, depending on the composition of the gases. The most frequently used catalyst is a noble metal such as platinum, coated onto a ceramic base. For calculation purposes, one can assume an average lifetime for the catalyst of 14,000 hours. Approximately one liter of catalyst should be used for each 25 cu m/h gas flow, a figure that can vary depending on the composition of the gases. In cases where the use of a catalyst is undesirable, direct afterburning can be used; higher temperatures, in the range of 600-800 C, are required. It also is necessary for the waste gases to be maintained at such temperatures ofr a period of 0.4-10.0 sec. The catalytic process requires less initial investment in equipment than direct afterburning (about $4-5./cu m waste gas, compared with $5-6.) Operating costs follow a similar pattern, but accurate figures are not available.

30403

Honda, Soichiro

INTRA-ROOM ELECTRIC DUST-COLLECTING ELECTRODE DEVICE FOR TREATMENT ROOM. (Shorishitsunai no shujin denkyoku sochi). Text in Japanese. (Honda Gijutsu Kenkyusho K. K. (Japan)) Japan. Pat. Sho 46-11032. 2p., April 16, 1971. (Appl. June 15, 1967, claims not given).

When a painted product is being dried in a drying room, mists or aerosols of various kinds become suspended in the room as the paint solvent evaporates. The suspended aerosol adheres to other painted products being dried in the room, adversely affecting their finish. The dust-collecting electrode device is designed to remove such suspended aerosols or mists. The lower inner side walls of the drying room are lined with a grounded-dust- collecting plate. An electric collector bar is fitted to one inner side wall by means of arm rods which are fixed on the inner side wall by insulators. A conveyor runs along the ceiling of the room. Suspended from the conveyor are a number of hangers made of conductive material, but insulated from the conveyor. Each hanger holds a painted item. These hangers are so installed that they may come in touch with the collector bar and slide along the bar. The collector bar is connected to a negative high-voltage DC generator. The painted items are conveyed from a painting room provided before the drying room. The painting room is of an electrostatic painting system and equipped with a similar grounded collector bar. The paint sprays or atomizers, installed opposite to the collector bar in the painting room, are connected to a positive high-voltage DC generator. With this arrangement, the mist or aerosol is negatively charged in the drying room so that it may be adsorbed by the positive dust-collecting electrode plate.

31231

Rody, Walter W.

ENVIRONMENTAL CONTROL AT THE LITTON ADVANCED MARINE PRODUCTION FACILITY. Nav. Engr. J., 83(3):86-95, June 1971.

The control methods adopted by a new facility of the Litton Ship System are discussed. There are several production processes that are potential air pollutants. Careful attention to the problem has greatly minimized or eliminated these as sources of air pollution. To prevent the emission of heavy concentrations of iron oxide dusts from the steel fabrication shop, the plates are sent through blast chambers with dust collectors. When the air is released to the atmosphere it is 99% particle free. This is accomplished by forcing the dust-filled air through 16,000 sq ft of cloth filter bags. To control pollution during painting operations, airless spray equipment is used to reduce the amount of overspray and dry dust that is produced by air spray equipment. When painting in open areas, the operators wear filtertype respirators; in painting closed compartments, they wear face masks for protection from solvent fumes. Welders are required to wear fresh air supplied face masks to prevent zinc poisoning. Fresh air is also forced into the welding area to protect other personnel. An industrial hygienist monitors all operations that produce respiratory irritants. Noise and water pollution are also discussed.

31301

Maier, Alfred

PROTECTION AGAINST IMMISSION IN THE WOODWORKING INDUSTRY. (Immissionsschutz beim holzbearbeitenden und -verarbeitenden Gewerbe). Text in German. Wasser Luft Betrieb, 15(6):214-219, June 1971. 8 refs.

Woodworking industries may pollute the neighborhood through dust emissions from firing systems, odors from lacquering stations, and wood and sawdust from wood cutting and polishing. Firing systems are usually heated with wood. Measurement of the dust content in the waste gases revealed that the dust may range from 650 to 4000 mg/cu m which grossly exceeds the 300 mg/cu m demanded by the VDI standard 2300. The dust is very fine-grained. About 50% of the dust was below 10 micron. The fraction of unburned material was almost 50% and the specific weight of the dusts averaged 1.9 g/cu cm. For efficient dust collection, centrifugal separators can be used. The fine dust developing at wood polishing machines is pneumatically drawn off and collected by cloth filters.

31472

Maier, Alfred

IMMISSION PROTECTION IN THE WOOD WORKING INDUSTRY. (Immissionsschutz beim holzbearbeitenden and und -verarbeitenden Gewerbe). Text in German. Wasser Luft Betrieb, 15(7):261-264, July 1971.

In lacquering stations of wood working plants, odorous solvent vapors develop which are mixed with the lacquer dust. Wet collectors are best suited for the removal of such emissions. With them, collection efficiencies of 99 to 99.5% can be achieved. Such high efficiency, however, is achieved only for the particulates in the vaporous emissions. For the solvents, the efficiency is low. Examinations of a cascade scrubber for emissions consisting of 29 mg/cu m of particulate matter and of 353 mg C/N cu m revealed that by doubling the water quantity the particulate emissions could be reduced to nine mg/cu m. However, the solvent emission was reduced to only 325 mg C/N cu m. The highest efficiency is achieved with a scrubber operating on the venturi principle. The lacquer mists are drawn off by a venturi-type nozzle. The atomized water droplets adsorb the lacquer particles. The water droplets are separated on subsequent steel sheet plates. An efficiency of 99.8% can be achieved.

31996

Hardison, L. C.

WHERE AIR POLLUTION CONTROL STANDS AS AN INDUSTRY. Instrument Society of America, Pittsburgh, Pa., Proc. Instr. Soc. Am. Chem. Petrol. Instr. Symp., 11th Annu., Chicago, Ill., 1970, p. 12-16. (April 8-10.)

Air pollution control is examined as a segment of industrial activity. The principal air-pollution sources are automobiles, utility electric plants, domestic heating, incineration, chemical processes, metallurgical processes, evaporation of paint and other coatings, and ventilation of food processing areas. The major pollutants are sulfur dioxide, carbon monoxide, nitrogen oxides, hydrocarbons, dusts, and fumes. Controls for these emissions include the electrostatic precipitator, mechanical collectors, fabric filters, wet scrubbers, and gaseous emission controls. The air pollution control problem is characterized from the viewpoint of manufacturers of abatement equipment and systems. The size and shape of the industry, the incentives to manufacturers and their responses, and the potentials for pitfalls and profits are examined.

32639

Glaeser, Eberhard, Egon-Ruediger Strich, Werner Tix, and Klaus-Dieter Lemke

CATALYST FOR THE SECONDARY CATALYTIC COMBUSTION OF WASTE GASES. (Katalysator fuer die katalytische Nachverbrennung von Abgasen). Text in German. (Eberhard Glaeser, Egon-Ruediger Strich, Werner Tix, and Klaus-Dieter Lemke) East Ger. Pat. 62,814. 3p., July 20, 1968. (Appl. Aug. 31, 1967, 3 claims).

A catalyst is described for the combustion of noxious pollutants in industrial waste gases or vapors from varnish drying plants, textile plants, the electric industry, stationary or mobile Diesel engines in enclosures, in mines, or in heavy high-traffic areas. The catalyst comprises a temperature-resistant metallic carrier coated with a layer of a rare metal; the carrier consists of cuttings or chips made, for example, from chrome-nickel steel on a planing machine or lathe. The cuttings are from 2 to 6 mm wide, 0.1 to 1 mm thick and are circle-, coil-, or spiral-shaped with an external curvature radius of 2 to 10 mm. The rare metal coating can be achieved by precipitating a thin layer of palladium on the chips from a 0.5% palladium chloride solution. Above the ignition temperature of 340 C this catalyst had, when used for the combustion of hydrocarbon solvents with air at a concentration of 8-25 g/N cu m, a catalytic effectiveness of 99%.

33181

Matsushita M

AIR CLEANER. (Kuki seijoki). Text in Japanese. (Matsushita Dendo Kogu K. K. (Japan)) Japan. Pat. Sho 46-24550. 3p., Aug. 24, 1971. (Appl. Oct. 26, 1968, claims not given).

An air cleaner is described which is a king of vaccum cleaner mounted on a push cart equipped with a lift mechanism. The main unit of the cleaner is an L-shaped tubular duct with a built-in electric suction fan. An opening on the front of the duct is covered with a fine-mesh wire screen and serves as the intake port; and opening on the top of duct serves as the discharge port. The cleaning unit is mounted on a U-shaped frame. The front upright plate of the U-shaped frame has an opening approximately the size of the front opening of the duct. This opening is also covered with a wire screen and, between the two screens, is a filter that can be wound onto a roller. Thus, a fresh portion of the filter can be wound out as needed. The air cleaner is very suitable for use in a paint factory, where it can be moved close to an object and directly suck in the air as the object is being painted.

33819

Peisert, Donald C. and Henry F. Mozina

THE CHALLENGE OF AIR POLLUTION CONTROL. Wire J., 4(11):47-51, Nov. 1971. (Presented at the Wire Association, Annual Convention, New York, N. Y., Oct. 26, 1970.)

By recycling the heat from incinerated smoke and solvent, magnet wire enameling ovens are fired at almost no operating cost, replacing catalysts. There is, of course, the capital cost of the direct thermal oxidizer, but smoke and solvent effluents from the oven are reduced to compliance levels, the object of the control effort. Temperature, time, and turbulence are the three basic parameters in a thermal oxidizer. Construction of the oxidizer and system engineering are discussed. At the present time most wire enameling ovens are designed with an internal catalyst which serves two purposes: one is the reduction of the hydrocarbon effluents and the second is to utilize the thermal energy provided by the burning hydrocarbons to reduce the volume of fuel gas required. A prototype is outlined of the adaption of a thermal oxidizer to an oven as the energy source. Synchronized dampers are indicated. (Author abstract modified)

34220

Waid, Donald E.

AIR POLLUTION CONTROL THROUGH THERMAL INCINERATION OF ORGANIC FINISHING FUMES. Ind. Finishing (Indianapolis), 46(6):32-36, June 1970.

Most installations for air pollution control in industrial finishing plants during the last few years, and all known installations under Rule 66 in Los Angeles County and Regulation 3 in the San Francisco Bay area, have been of the direct gas flame thermal incineration type. Operation of fume incineration equipment is discussed. Some of the advantages of the thermal process over other means of organic solvent control include its adaptability to future code changes and its stable performance from the time of installation. There are no additional materials or parts such as catalysts or charcoal to clean, reclaim or maintain, and in many cases oxygen from the effluent is utilized for combustion. The direct gas-fired thermal incinerator can readily be worked into a paint bake oven or other process heat equipment. Methods of heat recovery and field test reports are discussed.

34293

Terlyanskaya, A. T. and L. P. Finogeev

CATALYTIC PURIFICATION OF SPENT GASES FROM THE PRODUCTION OF PAINTS AND VARNISHES. (Kataliticheskaya ochistka otkhodyashchikh gazov proizvodstva lakokrasochnykh materialov). Text in Russian. Khim. Prom. (Moscow), no. 8:583-584, 1971. 2 refs.

The results are presented of an experimental investigation of the catalytic purification of waste gases during the production of varnishes and paints, carried out on a copper-chromium catalyst. The waste gases contained acrolein, phthalic anhydride, and xylene. The gases were analyzed before and after catalytic oxidation. Optimum conditions for the catalytic oxidation of waste gases were determined, including velocity, temperature, and amount of gas. The Cu-Cr catalyst can be used in the purification of waste gases from varnish production when the concentration of organic substances is no higher than three mg/l (with respect to xylene).

34574

Muehlen, Nikolaus von und zur

WASTE AIR IN THE AUTOMOBILE INDUSTRY. (Abluft in der Automobil-Industrie). Text in German. Staub, Reinhaltung Luft, 31(10):411-414, Oct. 1971.

A regulation has gone into effect in North Rhine Westphalia that limits the emissions from all plants where lacquers, dyes, or synthetics are applied to and dried on metal, paper, textiles, wood, and glass fiber. The carbon content of these waste gases may not exceed 300 mg/cu m waste gas. Before the regulation became effective, intensive experiments for cleaning these waste gases were carried out. Thermal combustion of the waste gases was sufficient if the carbon content was not higher than 500 to 700 mg/cu m. For higher carbon concentrations, a combination of thermal and catalytic afterburning was necessary. The heat developing at the combustion process can be utilized for the drying process. The preheating torch is supplied by 500 cu m fresh air/hr and about 1500 cu m waste air from the lacquer dryer. The solvent fractions contained in the waste air burn at 800 to 1000 C. The efficiency of this thermal combustion is 60 to 70% if the carbon content does not exceed 700 mg/cu m. For an additional catalytic combustion, platinum catalysts are used. The temperature of the waste gases prior to passage of the catalysts is 400 to 410 C, and afterwards it is 450 to 460 C. This temperature difference can be used for continuous determination of the efficiency of the catalyst.

34620

Bluhm, Hans-Joachim

CONTRIBUTION BY THE TIN CAN MANUFACTURING INDUSTRY TO THE LIMITATION OF EMISSIONS. (Der Beitrag der Feinstblechpackungsindustrie zur Emissionseingrenzung). Text in German. Staub, Reinhaltung Luft, 31(10):401-406, Oct. 1971.

During stove lacquering of tinned fine metal sheets (tin plate), emissions in the form of gaseous hydrocarbons develop, which are formed from the solvents contained in the lacquer and are present in a highly diluted state in the waste gas from the lacquer drying ovens. Since very little is known about the biological effect of hydrocarbons, such emissions should be avoided. In Germany, a regulation limits such emissions to 300 mg/cu m waste gas. Los Angeles limits the daily emission from lacquer drying ovens to 15 lbs. The best solution for the reduction of the hydrocarbon emission in these industries would be a coating process which does not require any solvents. Separation of the solvents by cooling or absorption on activated coal proved to be uneconomical because of the small concentrations (1.0 to 10 g/cu m waste air) present in the waste air. Combustion of the solvents in the waste air can be used. This oxidation causes the formation of water and carbon dioxide which are emitted instead of the solvents. If the oxidation is carried out in a flame, the waste air must be heated to temperatures between 700 and 900 C. Because of the high energy costs in Germany, this method is too expensive. Some pilo plants for catalytic combustion of the solvents are in operation in Germany. They are preceded by filtration for removal of catalyst poisons. Final results are not available yet, since the experiments are still in progress.

35595

McCabe, Louis C.

SANITARY ENGINEERING ASPECTS OF ATMOSPHERIC POLLUTION. J. Sanit. Eng. Div. Proc. Am. Soc. Civil Engrs., vol. 80:392-1 to 392-4, Jan. 1954. (Presented at the American Society of Civil Engineers, Annual Convention, New York, Oct. 21, 1953.)

The sanitary engineer has extensive experience with air pollution problems, notably waste disposal and odors. The need for odor control in industries which process dead animals may be greater than in the packing plants which are preparing food for human consumption. Some of the rendering plants in the Los Angeles area have used venturi jet condensers successfully but most rely on incineration to abate odors. Lack of cleanliness in maintenance may also account for odors around rendering plants. The greatest source of malodors in oil refineries are mercaptans which contain sulfur and are commonly derived from high sulfur crudes. Mercaptans may be removed from petroleum products by treating in a variety of processes, practically all of which utilize caustic action. Paint and varnish plants may discharge highly irritating substances such as acrolein, aldehydes, and fatty acids from their processes. Incineration of domestic household waste and garbage is generally not a sure means of eliminating odors in air pollution. Poor design, intermittent operation, and the character of the waste material are responsible for unsatisfactory operation. It is also recognized that hydrocarbons in the air may be oxidized to produce compounds which will damage growing crops and cause eye irritation. Some control equipment for dust, smoke, and fumes are noted.

35771

Senkevich, E. V.

CALCULATION OF A GAS COMBUSTION PROCESS USING EXHAUST AIR CONTAINING COMBUSTIBLE COMPONENTS. (Raschet protsessa szhiganiya gaza s ispolzovaniyem otbrosnogo vozdukha, soderzhashchego goryuchiye komponenty). Text in Russian. Gaz. Prom., 16(6):37-38, 1971.

A graphic method for the calculation of the afterburning of solvent-containing exhaust gas from paint driers with natural gas for air pollution prevention is presented. The driers may contain up to 25% (of the lower limit of explosion in admixture) of solvents such as toluene or xylene. Nomographs for the determination of the amount of the combustible pollutants in the exhaust air are given. Alignment charts expressing the variation of the true excess air coefficient and of the variation of the calculated excess air coefficient as affected by the concentration in combustible components in the exhaust air are developed.

35933

A PRACTICAL SOLUTION TO POLLUTION CONTROL COSTS FOR PAINT FINISHING LINES. Ind. Heating, 38(12):2421, 2422, 2428, Dec. 197

A large metal working plant which recently installed a coil coating line decided to make a virtue of necessity by installing a fume processing system of advanced design and radical concept. For, as it incinerates process oven fumes, enough Btu s are recovered to supply the plant s entire metal preparation heat and its entire building makeup air heat needs. At the same time, process oven heat demands are reduced nearly 44%. The hydrocarbons in the exhaust fumes are used as fuel for the heat recovery system, the heart of which is a Caliqua heat exchanger in the exhaust gas stream of the incinerator.

36130

NEW COMBUSTION CATALYST BEATS AIR POLLUTION. Fact. Manage. Maint., 110(7):124-125, July 1952.

A combustion catalyst is described which burns industrial solvents, resins, organic dyes, varnishes and lacquers, oil fumes, smokes, and other industrial wastes. The basic unit is a simple brick with 73 porcelain rods. Each rod has a coating of catalytic alumina and platinum alloy; this coating completely oxidizes combustibles even at temperatures well below their normal burning points. It generates enough waste heate to fire boilers and heat plant preocesses. In order to work, the catalyst must be raised to a temperature of 500 F, in most cases with a pre-heat burner at start-up. Once oxidizing, the unit will sustain combustion of room temperature gases. When oxidizng pure hydrocarbons, the catalyst should last indefinitely. The catalyst can be poisoned by metallic vapors.

36752

McCabe, Louis C.

ATMOSPHERIC POLLUTION. Ind. Eng. Chem., 43(12):97A-98A, 100A, Dec. 1951. 2 refs.

Considerable progress has been achieved in the Los Angeles area in reducing local odor nuisances. Odors from fish meal production in canneries have been eliminated by using low temperature dehydration; up to 15% more meal is recovered and nutrient values are higher. Increased power consumption is offset by reduced gas maintenance and consumption. Venturi jet condensers and incineration methods are used successfully in rendering plants. A newly developed low temperature coffee roaster significantly reduces the quantity of odors from coffee roasting installations. Control methods for mercaptan odors from oil refineries and for aldehydes and fatty acids from paint and varnish plants are also noted.

37126

Selheimer, C. W. and Charles Henry Borchers

EVALUATION OF MULTI-WASH COLLECTORS IN SUPPRESSION OF PAINT INDUSTRY FUMES. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(384):684-709, Aug. 1954. 9 refs.

Evaluation of a Schneible Multi-Wash Collector system used in the elimination of fumes from certain cooking operations in a paint and varnish plant was concerned with performance, construction, operational details, maintenance costs, means of increasing performance, and safety of operation of the unit tested. The chemical nature of the compounds in the fumes which cause the odor problem, the chemical composition of the raw fumes, and the gases released to the atmosphere were determined by infrared and mass spectrometry. The performance of the Multi-Wash Collector system was in the range of 95 to 99% removal of nuisance materials. The water spray leg does 85 to 88% of the work in controlling process fumes.

Although the dilution of the gases entering the collector by the large volume of air being bled into it would normally raise its apparent efficiency close to 100% the fact that this does not occur indicates that fumes washed from the same cooking process during the maximum evolution period or coming from the other two ulti-Wash Collectors are being re-liberated. The equipment is limited to removal of fumes condensed by or dissolved in the wash water, but does not and cannot remove the major odor-producing gases.

37127

Selheimer, C. W., Roland Armani, and Henry Jurczak

USE OF ACTIVATED CARBON TO ADSORB FUMES FROM PAINT AND VARNISH INDUSTRY COOKING OPERATIONS. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):629-643, Aug. 1954. 4 refs.

Four types of activated carbon were tested to the saturation point or break-through of fumes from esterification of tall oil with glycerine. The break-through point was determined by odor alone. Equipment was modified from previous work so that fumes passed successively through reflux condenser, water cooled condenser with trap, water scrubber, and finally through a carbon tower. The cooking operation followed a standard cycle requiring eight hours to complete. From the data obtained on saturation values of the various carbons, cost figures were calculated in terms of pounds oil/pound carbon and cost per 12,000-pound factory batch. There was a large spread in the performance of the various carbon samples.

37152

Selheimer, C. W. and Charles H. Borchers

OXIDATION OF FUMES FROM TALL OIL-GLYCERINE ESTERIFICATION WITH OZONE. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):644-646, Aug. 1954. 1 ref.

The effectiveness of ozone as a deodorizing agent for fumes from tall oil-glycerine esterification in the point industry was investigated on a laboratory scale. Fumes from the reaction, after passing successively through an air cooled condenser (reflux), water cooled condenser, and water scrubber, were mixed in a chamber with ozone laden air. The ozone was generated up to 0.2 gm per hour. This output was capable of deodorizing the fumes from this reaction up to kettle batch size of 700 gm total.

37254

Victor, Irving

CONTROL OF GASES AND VAPOR EMISSIONS FROM INDUSTRIAL AND DRYCLEANING PROCESSES COMPARING EFFICIENCY AND OPERATING COST OF INCINERATION, ABSORPTION, CONDENSATION AND ADSORPTION METHODS. Preprint, Dept. of Commerce, Washington, D. C. and Water Pollution Control Federation, Washington, D. C., 9p., 1971. 10 refs. (Presented at the Technical Conference on New Technology in the Solution of Practical Problems in Air and Water Pollution Control, Tokyo, Japan, Dec. 8, 1971.)

Control techniques for emissions of industrial chemical solvents, primarily hydrocarbons, from various industrial processes (surface coatings and vapor or solvent degreasing) and dry cleaning systems are reviewed. The efficiency, basic process, and operating costs of adsorption, especially activated carbon adsorption, incineration, absorption for scrubbing acids, chlorine, and ammonia, and condensation are examined.

37304

Gallen, Thomas J.

APPARATUS FOR FILTERING POLLUTANTS. (Assignee not given.) U. S. Pat. 3,599,399. 7p., Aug. 17, 1971. 13 refs. (Appl. March 8, 1968, 3 claims).

An apparatus for filtering pollutants, specifically paint and powder particles, from an airstream during a paint- and powder- spraying operation is presented. In conventional practice, paint particles are extracted by passing through paper, glass, or water media. The filtering apparatus removes the particles prior to reaching the conventional filters, thereby increasing their life and efficiency. The apparatus is compact, portable, easily cleaned, and can be adapted for use in conventional or electrostatic spray booths. The apparatus comprises a plurality of filter banks is series arrangement between the workpiece being spray painted and the conventional filter. The filter banks are alternately grounded and charged. (Author summary modified)

37494

Shigeta, Yoshihiro

BAD ODOR EMISSION CONTROL MEASURES AND EXAMPLES. (Akushu no haishutsu boshi taisaku to jitsurei). Text in Japanese. PPM (Japan), 3(1):55-62, Jan. 1972. 4 refs.

Main sources of bad odors in Japan are chemical engineering, Kraft pulp mills, petroleum refining, chemical fertilizer manufacturing, animals, corpses, fishmeal manufacturing, stockyards, public facilities, garage dumps, excretion treatment plants, and sewage treatment plants. In addition, foundries, paint factories, pharmaceutical factories, canneries, enamel electric wire factories, fish paste manufacturing plants, distilleries, fermentation plants, and rubber factories are sources of bad odors. The main points in bad odor control are the normalization of the human relationship between industries and inhabitants in the area, improvement of manufacturing or treatment processes, and improvement of maintenance and management of these odor creating sources. Various types of countermeasures such as dilution, decomposition of odor elements, and elimination of elements are discussed. Various methods of control such as combustion, catalytic oxidation, adsorption, ozone, acid-alkaline scrubbing, ion exchange resin, electrode, and water scrubbing methods are reviewed.

37804

Nesbitt, John D. and Klaus H. Hemsath

APPARATUS FOR TREATING GASES. (Midland-Ross Corp., Toledo, Ohio) U. S. Pat. 3,607,119. 5p., Sept. 21, 1971. 5 refs. (Appl. Sept. 30, 1969, 9 claims).

A combustion apparatus for thermally treating gases which are difficult to handle by mechanical compressors or pumps is presented. The apparatus comprises an internal combustion burner capable of producing a high-temperature and high-velocity jet stream of gases which is directed into an adjacent coaxially aligned chamber where it entrains, mixes with, and propels the low-velocity fumes which have entered through an inlet in the chamber and which are to be treated. The resultant gas stream is propelled through a constricting outlet section of the chamber having a cylindrical throat coaxially aligned with the jet stream. The relative location and size of the throat section are established so that the natural dispersion angle of the jet stream intersects the chamber walls adjacent the inlet end of the throat section or between the inlet and outlet ends of the throat section. A treating chamber is adjacent to the outlet of the throat section. This invention has been applied to the incineration of fumes from various industrial processes including wire-coating operations.

37885

Crowley, J. D.

LACQUER REFORMULATION. Paint Varnish Prod., 61(12):35-37, Dec. 1971.

Los Angeles Rule 66 attempts to regulate organic solvent vapor emissions into tthe atmosphere by reducing the amount of branched- chain emission products allowed. The immediate effect of these regulations on compounds is that there is a need for reformulated lacquers with reduced amounts of branched-chain products. Eastman Chemical Products has recently introduced methyl n-butyl ketone as a new commercial solvent. In addition to the advantage of its reduced photochemical reactivity, MBK is a medium evaporating solvent which, when used in coatings formulations, results in compounds with much lower viscosities than would be expected. Other0 advantages of MBK are cited, as well as the laboratory re of its physical properties.

38195

Mueller, James H.

FUME AND ODOR CONTROL SYSTEMS COMPARED AND ANALYZED. Wood Wood Prod., 76(3):48-50, March 1971.

A common problem in the wood products industry is the control of fumes and odors produced by veneer dryers, paint spray booths, gluing operations, and finishing lines. The three basic types of control equipment that will meet or exceed pollution control regulations are the afterburner, the afterburner plus heat exchanger, and the thermal regenerative air purification system (TRAPS). The three systems, each of which heats process exhaust to 1400 F for 1/2 sec. are compared with respect to size, capacity, nitrogen oxides production, equipment costs, and annual costs. While the initial cost of the TRAPS system is high, this system has the lowest annual cost, including annual fuel cost, and the lowest rate of nitrogen oxides production. Thermal recovery efficiency of the system is 75%, versus 40% for the afterburner with heat recovery.

38651

REMOVAL OF THE GASES IN A CZECHOSLOVAKIAN VARNISH ENTERPRISE. (Abgasbeseitigung in einer tschechischen Lackfabrik). Text in German. Farbe Lack, 78(1):89, Jan. 1972.

From the esterification boiler used for the production of synthetic lacquers, a mixture of solid, liquid, and gaseous substances is emitted forming a white smoke with a pungent odor. New equipment has been developed to utilize these emitted substances for the production of special resin lacquers. The new equipment consists of a cooled discharger for solid and condensable substances and a thermo-reactor for the thermal oxidation of the remaining substances. The discharger consists of a cabinet of a diameter of 500 by 250 mm and a tube system arranged in twelve floors. The tubes are first cooled with water so that the solid substances contained in the flue gas settle down on the tube surface while, at the same time, the liquid reaction products are condensed. At the end of the gas development steam is fed into the tubes so that the sedimentated substances are heated and transformed into a pasty substance flowing on the bottom of the discharger from where it can be easily removed. The flue gases emitted from the discharger are fed into the thermo-reactor where the organic substances still contained in the gas are removed at a temperature of 600 C.

39149

Zenkner, K.

FLAME SIZE AND BURNING BEHAVIOR IN THERMAL AFTERBURNERS. (Flammengroesse und Ausbrandverhalten bei thermischen Nachverbrennungsanlagen). Text in German. Luftverunreinigung, 1971:31-33, Dec. 1971.

Experiments carried out on a thermal afterburner in a surface-coating shop are described. The air, preheated in a heat exchanger, is admitted to the burning chamber through a burner, and is burned in the presence of natural gas or light oil. Turbulence is provided for complete combustion, and an average chamber temperature is stabilized by means of auxiliary energy. The burned gases are recycled to the heat exchanger. The air should be preheated to a temperature close to that required for complete combustion, and ignition is absolutely necessary. A minimum flame size, dependent on the preheat temperature, is necessary for the initial ignition, even if no auxiliary energy is needed. However, the pilot burner alone is not sufficient, even at extremely high preheating temperatures. The pilot flame distribution should be uniform as it affects the carbon monoxide content. The combustion quality, showing fluctuations of more than 50%, is strongly influenced by variations in the flame size. A minimum burning chamber temperature of 750 C is necessary to obtain pollutant concentrations below the odor threshold. The corresponding value for xylene is 710 C.

39286

Brewer, G. L.

ODOR CONTROL FOR KETTLE COOKING. J. Pollution Control Assoc., 13(4):167-169, April 1963. 4 refs. (Presented at the Air Pollution Control Association Annual Meeting, 55th, Chicago, Ill., May 20-24, 1962.)

Nearly all kettle operations, including the manufacture of paints, varnishes, chemicals, and asphalt, involve a fume and odor problem. The release of the hazardous combustible fumes and objectionable odors to the atmosphere results in widespread neighborhood complaints and damage to property and vegetation. The most successful method of eliminating these problems is catalytic combustion, i.e., oxidation of combustible kettle gases in the presence of a platinum catalyst. The catalyst enhances the oxidation reaction in two ways: it lowers the temperatures required for sustaining combustion and decreases the dwell time. Products of the reaction are carbon dioxide, water vapor, and heat. Because of the high efficiency of catalysis (99.5%), essentially all combustibles are converted to inerts. Operating and maintenance costs of catalytic systems are substantially lower than for thermal combustion systems. In addition, the catalytic systems do not require disposal of contaminated water or sludge, since fumes are kept in a gaseous state throughout the process.

39295

Selheimer, C. W., Lawrence White, and Glen Workman

CATALYTIC COMBUSTION OF FUMES FROM TALL OIL-GYLCERINE ESTERIFICATION, PILOT PLANT SIZE EQUIPMENT. Off. Fed. Paint Varn. Prod. Clubs, 26(348):664-683, Aug. 1954. 223 refs.

As part of a paint and varnish industry fume control project, fumes from a tall -oil glycerine esterification, generated in a pilot-plant-size unit, were passed through a portable catalytic combustion unit. Results of the test indicate the combustion unit was capable of considerable odor reduction, but the discharged gases were very irritating to the eyes and nose. Apparently sulfur compounds in the gas stream were converted to oxides. The unit is not recommended under such conditions. A bibliography covering all articles on catalytic oxidation for the years 1907 to 1952, including those but remotely connected to this problem, is included. (Author abstract modified)

39296

Selheimer, C. W., John P. Antolak, and Jack Paskind

OXIDATION OF FUMES FROM TALL OIL-GLYCERINE ESTERIFICATION WITH OZONE. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):647-652, Aug. 1954. 5 refs.

As part of a paint and varnish industry fume control project, fumes from tall oil-glycerine esterification were treated with ozone laden air in a pilot plant scale operation. Ozone was obtained from a commerical size electrostatic generator. Three cooks were conducted, using carbon dioxide as the blanketing gas. The fumes, after passing through a spray tower, were mixed with the ozone laden air. Before mixing with ozone the fumes were foul and irritating, while after ozone treatment, the foul odors were largely eliminated. The economics of this operation are covered to the extent of the data. The cost of equipment and operation are excessive when compared with other methods of fume treatment.

39683

Edelen, Earl W., Howard L. Clark, and John L. Hodges

ODOR CONTROL IN LOW ANGELES COUNTY. Air Repair, 1(3):1-4, Feb. 1952.

Several examples are given of successful odor pollution control in Los Angeles County, where the principal sources of noxious odors have been fish canneries, paint and varnish works, and chemical plants. Installation of low-temperature dehydration units in the canneries eliminated odors from burned fish meal; at the same time 15% more meal was produced and the nutritional value, and hence the market value, of the product increased. Most paint and varnish plants in the Los Angeles area employ scrubbers to reduce odors from acrolein, other aldehydes, and fatty acids; however incineration is the surest and most efficient method, although more expensive. Since controls were established, the large number of odor nuisance complaints has decreased to about one each month, most of which are caused by equipment breakdowns or careless operation.

39792

Ruff, R. J.

CATALYTIC COMBUSTION OF HYDROCARBON VAPORS. Interdepartmental Committee on Air Pollution, Washington, D. C., Air Pollut., Proc. U. S. Tech. Conf., Washington, D. C., 1950, p. 259-263. (May 3-5, Louis C. McCabe, ed.)

A recently developed catalytic method of fume incineration permits effective oxidation of hydrocarbon vapors at reasonable cost, provided that the fumes are substantially free of unburnable solids and that metals such as mercury and zinc, which will deactivate the catalyst, are not present. The catalyst, in the form of a metallic filter mat, is constructed to provide a high surface exposure, turbulence in passage through the element, and reasonable minimum resistance to flow. Sustained discharge temperatures above 1200 F are permissible without damage to the catalyst. Of the units operating to date, none have become deactivated until about 4000 hr of service. Reactivation is possible at reasonable cost. The principles of operation and details of use with various types of ovens and furnaces are explained. Applications include rendering and surface coating operations, solvent evaporation processes, coffee roasting, chemical processing plastics manufacturing, and paper printing and varnishing.

40465

Siepmann R. and K. Reith

CATALYTIC EXHAUST GAS PURIFIERS FOR SMALL PLANTS. (Katalytischer Abgasreiniger fuer Kleinanlagen). Text in German. Wasser Luft Betrieb, 16(5):142-143, May 1972.

Exhaust gases containing organic pollutants are now mostly cleaned by catalytic or thermal afterburning. At larger waste gas quantities the economical operation of such afterburners depends on the heat recovery and its re-use. For waste gas quantities of up to few thousand cu m/hr, heat recovery is no longer economical. A rather simple design of the afterburner is feasible in such cases. A catalytic afterburner consisting of a cylindrical container which conically widens on top is described. It comes in three sizes with capacities to 250, 500, and 1000 cu m/hr. The waste air which enters the afterburner is heated by means of a burner fired with city gas, natural gas, liquid gas, or fuel oil. A guide vane imparts a rotary movement on the waste gas flow and mixes it with the hot gases from the burner. Next the gas flow passes the catalyst and is burned to harmless CO2 and water. The afterburner is made of stainless steel for avoidance of corrosion. A honeycomb catalyst is used instead of the conventional pellets or spheres. The afterburner has been successfully used in a meat curing plant, at drying stations for food, and at lacquering stations. An average collection efficiency of 99.7% could be achieved.

40948

Starkman, Ernest H.

POLLUTION CONTROL BUDS AT GM. Ind. Week, 173(5):28-32, May 1, 1972.

Modifying processes and the materials going into them are an important part of General Motors approach to air pollution control in its plants. General Motors is trying both to develop new solvents and also to develop a dry powder substitute for wet paint which will eliminate the solvent entirely. Similarly, air pollution requirements are being met in GM foundries by modifications in production processes. Cupolas at Saginaw, Michigan, are being converted to induction furnaces so that the problem is about 90% eliminated just by not using coal. A program is being worked on to obtain a full-scale demonstration system of a totally conserved water process. With regard to the automobile, it is suggested that emission requirements are exaggerated. The question has never been whether there should be controls, but it has always been at what level should controls be established to achieve the best balance between appropriate environmental protection and the resulting impact on our national economy and our natural resources.

41079

Hoffmann, Alfred and Heinrich Klein

TORNADO-FLOW APPARATUS FOR SEPARATING PARTICULATE SUBSTANCE FROM GASES, PARTICULARLY ADHESIVE LIQUIDS FROM GASES. (Siemens A. G., Berlin (West Germany)) U. S. Pat. 3,641,743. 4p., Feb. 15, 1972. 7 refs. (Appl. March 11, 1969, 3 claims).

A tornado flow apparatus is described for separating adhesive liquids, such as paint sprays or other easily adhering substances, from gases. The apparatus comprises a cylindrical separator vessel with an axial clean gas outlet, a gas inlet duct coaxially opposite the outlet, and tangential gas inlets obliquely opposed to the flow direction of the inlet duct. Thus, a tornado flow is produced in the vessel which causes the particulate substance to be separated from the gas and carried outward into an annular interspace surrounding the axial inlet duct. Nozzle devices are provided for producing a veil of liquid in the tornado chamber or on the inner wall surface of the chamber. Preferably the devices comprise a spray nozzle coaxially mounted in the mouth of the inlet duct to produce a conical veil of liquid in the lower region of the vessel, and tangential nozzle means in the upper region of the vessel inject liquid to wet the inner wall of the vessel. (Author abstract modified)

41195

Kriegel, E.

PERFORATED-BASE SCRUBBER FOR THE EXHAUST AIR FROM PAINT PLANTS. DEVELOPMENT AND OPERATING RESULTS. (Siebboden-waescher fuer die abluft von Lackieranlagen. Entwicklungs- und Betriebserg ebnisse). Tech. Mitt. Krupp, 28(3):97-103, 1970. 2 refs. Translated from German. 21p.

Based on an industrial evaluation of existing wet scrubbers for spray painting plants and on an analysis of the requirements, a scrubber in which the exhaust air is purified in a layer of bubbles or foam on a perforated base was developed and studied. A working model, a pilot system, and finally a working system were produced and tested. Through use of similarity relations, stepwise enlargement of the test systems caused no difficulty. The capacity of the perforated-base scrubber was finally tested under practical conditions in a full-scale working system to obtain operating data especially on fouling, during longer working periods. Air throughput, water circulation, water evaporation, formation of bubble layers, pressure loss, and degree of separation were measured. Standard values taken from the literature provide a direct comparison of the perforated-base scrubber with conventional methods. Due to the success of the prototype, the perforated-base scrubber is being introduced into general use. (Author summary modified)

41522

Best, W. H.

INCINERATION: STATE OF THE ART. Ind. Gas, 52(5):15-18, May 1972.

Natural gas-fired incinerators are an effective tool for controlling many potential pollutants. Gaseous and fine paraticulate hydrocarbons can often be incinerated by raising their temperature above the auto-ignition point. The amount of contaminant must be small, and the volume of inert carrier must be large. For paint curing ovens, 10,000 cu ft of air must be used for each gallon of solvent. Direct flame incineration can be used for those gases having heating values as low as 100 Btu/cu ft; many gases with lower heating values can sustain combustion when preheated to 700 F. Thermal incineration is an excellent alternative for wastes with very low heating values. Temperature and dwell time can be adjusted to provide complete oxidation. Liquid incineration is often possible. Through atomization, organic compounds with water can be incinerated; usually a secondary combustion chamber is required. In some instances, multiple treatment may be necessary to remove toxic material either created in the combustion process or not consumed by it. Fume incineration without heat recovery is a waste of energy. A well- designed counterflow heat exchanger, though initially expensive, can reduce the cost of operation by as much as 70% by preheating the waste gases. Where the recovered heat can be used elsewhere, the cost of operation can be cut even further.

41592

Baylis, R. L.

NON-AQUEOUS DISPERSION FINISHES-INDUSTRIAL ORGANIC FINISHES WITH REDUCED POLLUTION LEVEL. Trans. Inst. Metal Finish., 50(Part 2): 80-86, 1972.

The majority of industrial finishes now in use are based on aromatic solvents, which are recognized as potential sources of pollution. The substitution of non-aqueous dispersions, especially aliphatic hydrocarbons, can reduce air pollution and improve processing. Both thermoplastic and thermosetting finishes have been developed with process characteristics similar to conventional finishes. Using aliphatic solvents, the atomized paint particles arrive at the surface in a high solids state. This gives the capability for high build with freedom from sags and runs. The baking schedules for solution and NAD are identical. Under air pollution solvent restrictions expected to come into force in 1974, paint formulators will be faced with limitations on the type and amount of solvent to be used. The NAD finishes fill the legislative requirements and can readily be used in existing processes.

41627

Muehlen, Nikolaus Von zur

AIR POLLUTION IN THE AUTOMOBILE INDUSTRY. Staub, Reinhaltung Luft, 131(10):411-414, Oct. 1971.

The major emissions form automobile manufacturing are the solvents from lacquer drying. Thermal and catalytic combustion was used for the destruction of the solvent vapors in a car factory; the heat was recovered and used for the drying ovens. Catalyst poisoning was not observed during two years of operation of the catalytic plant, and maintenance was chiefly in the washing of catalytic elements with distilled water. The economics of direct flame and catalytic combustion are compared. Other pollution measures, such as a large garbage incineration plant with 20 t/day capacity, a sludge separation plant, and a chemical treatment plant for chromium, nickel, copper, iron, and cyanide and mentioned.

41783

Kreisler, R.

ODOR PROBLEMS IN THE LACQUER INDUSTRY. (Geruchsprobleme der Lackindustrie). Text in German. Schriftenreihe Ver. Wasser-Boden- Lufthyg. (Berlin), no 35:105-111, 1971. (Presented at the Colloquium Geruchsbelaestigende Stoffe, Duesseldorf, West Germany, March 18, 1971.)

Odor problems develop in the lacquer industry in the production of resins, the production of lacquers, their applicaton, and particularly the drying and burning of lacquered material. Odor emissions in the first two cases are avoided by using entirely enclosed process facilities. In order to avoid odor emissions in the application of lacquers, aqueous lacquer solutions are applied by dipping. The concentration of organic substances in waste gases from such processes were 1.8 mg/cu m maximum. This low concentration of odorous substances in the waste gas makes any total removal more difficult. Thermal and catalytic afterburners are widely used in the lacquer industry. Enormous efforts have been made for developing lacquering processes which work without solvents. Such processes include plating material with foils which have the appearance of a lacquer film or the use of pulverized lacquers.

42853

Schadt, H. F.

FUME INCINERATION HEAT RECOVERY CUTS POLLUTION CONTROL COST. Heating, Piping, Air Conditioning, 44(7):79-80, July 1972.

High efficiency heat recovery systems which are built into incinerators have been developed in the last few years. These systems take a variety of forms, including air-to-air exchangers used to heat exhaust prior to its entry into an incinerator, and air-to-liquid systems designed to recover waste for use in metal preparation operations, in heating ovens, and for heating plant makeup air. One of the most recent major systems of the liquid heat recovery type is in installation on a new coil coating line at Peotone, Ill. This is a high pressure hot water heat recovery system operated in conjunction with two solvent fume incinerators. Design data, controls, and safety features of this installation are indicated.

43362

Hayashi, Kenzo

FILTER ATTACHMENT DEVICE FOR MICROPARTICLES IN GASES OR ATOMIZED PAINT. (Gokiryo no bijin matawa toryo mukaryushi nado no rokatai toritsuke sochi). Text in Japanese. (Joban Electric Appliances Co., Ltd. (Japan)) Japan. Pat. Sho 47-7356. 3p., March 17, 1972. (Appl. May 8, 1969, 1 claim).

This utility model is to be installed in the filter device or air cleaner of a paint plant, where dust-containing air or aerosol paint can be filtered effectively by a zigzag arrangement of these filters. The loading of the filters is very easy and the cleaning recovery of the filter material is also simple. The frame is made of aluminum or some other light metal, rigid plastic, or wood, in an oblong or right square. The top and the lower sides have parallel rail channels outside, and hooking channels inside. The filter material to be loaded on this frame is made of an outer package of wire mesh which is stuffed with an appropriate filter material chosen according to individual needs, such as glasswool, chemical fiber, felt, steelwool, or activated carbon.

43446

Hishida, Kazuo, Kinzo Nakano, and Minoru Takeda

CHARACTERISTICS AND TREATMENT OF WASTE GAS FROM AEROSOL PAINT PROCESSING. (Funmu toso ni tomonau hai gasu no seijo to taisaku) Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):82, 1969. (Presented at the Japan Society of Air Pollution, Annual Meeting, 10th, Tokyo, Japan, 1969, Paper 81.)

Seventy-seven complaints against aerosol paint, which were 40.5% of the total complaints in 1968 against air pollutant industrial dusts, and 65 complaints against paint solvent odor, which was 13.4% of the total 1968 complaints against industrial odors, show a high rate of problems with aerosol paint processing. Generally, paint already has approximately 50% solvent in it, and 20 to 100% more thinner is added immediately before the use, increasing the surface area per unit particle of microparticles of paint. This enhances evaporation. The emission cannot be collected by a wet booth alone, so it has to be discharged in the air through an exhaust pipe. Either a wet (water scrubbing) or dry (filter) treatment and exhaust pipe are necessary in order to maintain the maximum concentration of less than 150 mg/N cu m, a mean concentration of approximately 75 mg/N cu m. Aerosol paint booths of most scales and types are available. The emission from the exhaust pipe should maintain a 1/10 level of the labor environment maximum concentration, or 1/100 of the hour-average concentration permitted by the labor law. When concentration exceeds these levels, the organic solvent emission should be reduced by combustion, adsorption, or contact oxidation.

44245

Schaetzle, P.

ELIMINATION OF GASEOUS AIR POLLUTANTS. PART I: THE THERMAL AND CATALYTIC COMBUSTION. (Elimination gasfoermiger Luftverunreinigungen 1. Teil: Die thermische und katalytische Verbrennung). Text in German. Chem. Rundschau (Solothurn), 25(31):985, Aug. 1972.

Thermal afterburning assumes an important role in waste gas cleaning. It produces no scrubbing water which must be eliminated and no adsorbent which must be recovered. Prerequisite for an efficient thermal afterburning process is the combustibility of the pollutants. The oxidation should not lead to other undesirable substances (such as chlorine, hydrochloric acid, or oxides of nitrogen). There are two types of thermal waste gas treatment, direct and catalytic combustion. For direct combustion the waste gases are passed into a special combustion chamber where they are heated to more than 800 C. The efficiency of this method is influenced by the residence time and the air surplus. The method is used in the chemical industry, the lacquer and paint industry, the plastics industry, and rendering. The catalytic method uses precious metal (mainly platinum) catalysts on metallic or ceramic carriers for increasing the reaction speed so that the desired conversion takes place at much lower temperatures, usually between 300 and 400 C. This method cannot be used when the waste gases contain substances which impair the activity of the catalyst such as heavy metals, halogens, phosphorus compounds, and arsenic.

44637

DiGiacomo, Joseph D.

NEW APPROACHES TO THE DESIGN OF AFTERBURNERS FOR VARNISH COOLERS. Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 30p., 1972. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 65th, Miami, Fla., June 18-22, Paper 72-103.)

It is apparent that the best method of controlling varnish kettle emissions is by thermal incineration. Earlier thermal incineration systems utilized conventional combustion equipment such as the refractory nozzle-external blower and the refractory nozzle-100% premix. The new approaches utilize either of two completely different combustion systems. One, the integral-blower burner, offers substantial decreases in installation, operating, and maintenance costs. Installation costs are reduced by eliminating expensive combustion air piping, by making burner mounting, easier, and by giving simple adjustments for initial start-up. Operating costs are reduced by taking advantage of the heat energy available in the fume stream and the burner turn-down ratio of 40:1. Maintenance costs are reduced because the cast iron burner nozzle needs no repair or replacement. The second new approach utilizes a non-powered raw gas burner. Combustion air is obtained from the fume stream, eliminating the need for a combustion air blower. Installation costs are reduced by elimination of the combustion air blower, the in-line mounting of the burner, and the simple gas train piping. Maintenance costs are reduced because the burner has no moving parts. Operating costs are decreased by utilizing the heat energy available in the effluent. Further fuel savings occur by the increase of approximately 25% in the net heat available from the fuel. The new approaches achieve an increase of almost 100% in mixing velocity. This increase in turbulence reduces maximum fuel consumption by approximately 20%. Residence time is reduced by 29% by means of the non-powered raw gas burner approach. The length/diameter ratio is significantly reduced, and an average of 65% is achieved. Either approach offers significant advantages over conventional methods.

44812

Ruff, R. J.

FUME DISPOSAL BY CATALYTIC COMBUSTION. Eng. Bull. Purdue Univ., Eng. Ext. Ser., no. 83:117-185, 1953.

Some basic principles of catalytic combustion are defined and discussed, and industrial applications of catalytic combustion for fume disposal are reviewed. Catalytic oxidation is broadly applicable to hydrocarbons and organic type fumes, including alcohols, esters, ketones, ethers, acrolein, and aldehydes, as well as hydrogen, carbon monoxide, and mercaptans. From the standpoint of initial cost, there are no serious volumetric limitations. Several systems have been supplied for volumes as low as 20 cfm; others have capacities of over 20,000 cfm. Because of the requirements for preheating to catalytic ignition temperature, operating costs may increase directly with the volume, but inversely with fume energy concentration. The process is considered unsuitable for use where the fumes contain large amounts of cinders, inorganic solids, or vaporized metals that would cause rapid deterioration of the catalyst, as in foundry cupolas, blast furnaces, or coal-fired boilers. Process applications include foundry core-baking oven using linseed oil and similar core binders, oil cooling kettles, alkyd resin cooking kettles for paint manufacturing, phenolic resin curing ovens, dryers of high-speed paper printing presses, oil burn-off furnaces used in vaporizing kerosene and light oils from transformer punchings, kilns for firing wax-bonded ceramics, organic chemical plants, and wire enameling ovens. A field study of potential applications, prior to design development, includes investigation of manufacturing processes causing fume generation; nature of fumes, their rates of liberation or cyclical behavior; exhaust volume requirements; control and safety equipment existing on the fume generating process; presence of condensate in existing exhaust lines, and the opportunities for use of reclaimed heat where fumes have high energy concentration.

45071

Ross, R. D.

INCINERATION OF SOLVENT-AIR MIXTURES. Preprint, American Inst. of Chemical Engineers, New York, 9p., 1971. (Presented at the American Inst. of Chemical Engineers National Meeting, 70th, Atlantic City, N. J., Aug. 29-Sept. 1, 1971, Paper 48b.)

Solvent-air mixtures come from the drying and coating of a various materials, spray painting, adhesive bonding, the polymerization of various coatings, and the venting of solvent storage tanks and lines. Incineration is a satisfactory method for the destruction of these mixtures to meet air pollution regulations. The solvents used in most industrial applications can be classified as hydrocarbons, chlorinated hydrocarbons, or sulfonated solvents. The three basic types of incineration which are applicable to solvent-air mixtures are direct flame, thermal, and catalytic incineration. Direct flame incineration is used only when the solvent-air mixture contains enough solvent that the mixture can act as a fuel and when mixed with additional air will sustain combustion. Thermal incineration is applicable to a wide range of air-solvent mixtures and will produce a clear, hydrocarbon-free effluent if certain rules are followed. The solvent concentration should be below 25% of the lower explosive limit or at least not higher than 50% of the LEL under any conditions. The incinerator must provide sufficient time for the combustion reaction, sufficient turbulence to obtain good mixing between the products from the burner of the incinerator and the air-solvent mixture, and sufficient temperature to cause the oxidation to proceed rapidly to completion. The thermal incinerator can be a chamber of almost any type of cross section although a cylindrical chamber is generally preferred. The burner for the thermal incinerator can be a conventional gas- or oil fired unit. A catalytic incinerator is basically a thermal incinerator with a catalyst added. Most catalytic reactions can proceed at preheat temperatures between 600-1000 F, which results in a fuel saving when compared with thermal systems, but the preheat temperature is dependent on the type of catalyst used and the type of solvent to be destroyed. Both the catalytic and thermal incineration methods lend themselves to heat recuperation. Chlorinated and sulfonated solvents produce hydrochloric acid and sulfur dioxide or sulfur trioxide which must be subjected to scrubber treatments before disposal.

45087

Public Health Service, Washington, D. C., National Air Pollution Control Administration

CONTROL TECHNIQUES FOR HYDROCARBON AND ORGANIC SOLVENT EMISSIONS FROM STATIONARY SOURCES. AP-68, 114p., March 1970. 120 refs. GPO

Information is presented on techniques for the control of organic emissions from stationary sources. Methods used to control hydrocarbon and organic solvent emissions are operational or process changes, substitution of materials, and installation of control equipment. Techniques used in control devices are of four classifications: incineration, adsorption, absorption, and condensation. Incineration devices are of two types, direct flame afterburners and catalytic afterburners. Activated carbon adsorbers collect organic vapors in the capillary surface of the solid adsorbent, while absorption is the transfer of a soluble component of a gas phase into a relatively nonvolatile liquid absorbent. Condensers collect organic emission by lowering the temperature of the gaseous stream to the condensation point of that material. The use of less photochemically reactive materials is considered. Control systems for industrial processes are discussed for petroleum refining, gasoline distribution systems, chemical plants, paint, lacquer, and varnish manufacture, rubber and plastic products manufacture, surface coatings applications, degreasing operations, dry cleaning, stationary fuel combustion, metallurgical coke plants, sewage treatment plants, waste disposal, and food and feed operations. Economic considerations are included.

45233

Turitani, T.

THE PROBLEM AND ITS SOLUTION OF THE DUST AND MIST COLLECTION IN A PIGMENT FACTORY. (Ganryo kojo ni okeru shujin no mondaiten to sono taisaku). Text in Japanese. Kuki Seijo (Clean Air -J. Japan Air Cleaning Assoc., Tokyo), 10(3):32-38, Aug. 1972. 7 refs.

A general discussion is given on the physical properties of pigments and the collections problems encountered at pigment factories. Inorganic pigments are generally hydrophilic, while organic pigments are hydrophobic. The diameter of pigment color is about 10 to 30 A. However, the pigment powder has a large distribution of particle size. The bag filter is the main device used for dust collection, and in addition to this, the designations of the hood and duct for the gas path are important. For a better collection efficiency, it is required that the size of the particulates be 0.5 to 50 micron and that the dust concentration be small. An example shows that a 99.9% collection efficiency can be obtained when a bag filter with a polyester filter fiber is used for the collection at a filtering velocity of 0.5 to 2 cm/sec.

45234

Ito, M.

PROBLEMS OF DUST COLLECTION AT PAINT FACTORIES AND COUNTERMEASURES. (Toryo Kojo ni okeru shujin mondai to sono taisaku). Text in Japanese. Kuki Seijo (Clean Air -J. Japan Air Cleaning Assoc., Tokyo), 10(3):23-31. Aug 1972.

A general discussion is given on dust collection at paint factories. A large variety of material are used at paint factories, and the particle sizes are as small as less than one micron. Therefore, special consideration is required for the specific purpose. Upon designation of the exhaust gas system, the determinations of the exhaust gas direction, the type of hood, and the control velocity of the gas are important. The control velocity of the gas ranges from 0.25 m/sec to 10.0 m/sec depending on the sources. Dry type dust collectors are used for collection at paint factories, and the bag filter is most suitable. Both digital dust meters and high volume samplers are used for the measurements of pigment particulates. A gas detecting tube is used for the measurement of organic solvent vapors.

46035

Cross, F. L., Jr. and Glenn E. Benson

IS INCINERATION THE ONLY ALTERNATIVE FOR CONTROLLING AIR POLLUTION EMISSIONS FROM THE MANUFACTURE OF STEEL SHIPPING CONTAINERS? Preprint, American Inst. of Chemical Engineers, New York, 30p., 1972. 5 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 72nd, St. Louis, Mo., May 21-24, 1972.)

Different alternative methods of controlling atmospheric emissions are discussed. The steel shipping container industry has expanded and standardized its product. This industry is currently confronted with air pollution codes relating to odors, particulates, and hydrocarbon emissions from the manufacturing operations. The manufacturing process is described. The Environmental Protection Agency has recently promulgated a national ambient air quality standard for hydrocarbons. The standard -- 160 micrograms/cu m is a maximum 3-hour concentration not to be exceeded more than once a year. Many states have not stipulated allowable hydrocarbon or solvent emissions from paint-drying ovens or paint-spray operations. Thermal incineration, catalytic incineration adsorption, and process modifications are methods by which solvent emissions from paint-spray operations and paint bake ovens may be controlled. Thermal incineration should be used to control the atmospheric emissions from a steel shipping container plant. A typical design would include provisions for ducting the emissions from the ovens to one fume incinerator and the emissions from the spray booths to a separate incinerator. Economic considerations dictate that the proposed system operate with a heat-recovery unit with a minimum of 65% heat recovery. With a rotary regenerative heat exchanger, 75 to 80% heat recovery may be possible. The incinerator of the proposed fume incinerator would handle approximately 20,000 standard cu ft/m of process gases. The afterburner should be the modulating type. The capability of adjusting heat input has to be of optimum condition. Low-sulfur oil may be necessary if there is a scarcity of natural gas. The air for atomization of fuel oil must be drawn off the process air stream before the process air passes through the heat exchanger. Burner arrangement must be of such a design that the preheated effluent gases pass through the flame upon entering the incinerator. (Author conclusions modified)

46060

Vick, Erhard

CLEAN AIR IS NOT DULL THEORY. A COMMUNICATION ON WASTE GAS CLEANING EQUIPMENT. (Reine Luft ist keine graue Theorie. Ein Erfahrungsbericht ueber Abluftreinigungsanlagen). Text in German. Ind. Lackier Betr., no. 4, 1972.

Various direct burning equipment designed for waste gas cleaning in lacquering shops is described. The waste gases contain vapors or aerosols of combustible organic substances. Drying furnace waste gases of 200 and 120 C temperature are incinerated in a temperature range of 650-750 C in a coil coating plant. The carbon content is reduced from 1500 to 30 mg/N cu m, corresponding to an efficiency of 98-99.5%. The phenol and formaldehyde vapors present in waste gases of 200-300 C temperature in a mineral fiber processing plant are burned at a reaction temperature of 770 C. The hot cleaned air is used to preheat the fresh air for the drying furnace. Automatic cleaning equipment treats the waste gases from the drying furnace of an auto parts lacquering shop at 600-850 C with an efficiency of 99.5%. The waste gases from another lacquering shop drying furnace are burned at 800 C, with efficiency at 98% (carbon content reduced from 4000 to 80 mg/N cu m). Economic calculations for different reaction temperatures and throughput capacities are presented.

46061

Vick, Erhard

ENVIRONMENTAL PROTECTION IN LACQUERING SHOPS AND PRETREATMENT FACILITIES. (Umweltschutz bei Lackieranlagen und Vorbehandlungen). Text in German. Ind. Lackier-Betr., no. 3:97-104, 1971.

Different environmental protection techniques as applied in lacquering shops are reviewed. The spent air from drying furnaces and other equipment, containing organic vapors, is cleaned mostly by thermal or catalytic incineration. The optimum conditions for catalytic incineration are a temperature range of 400-800 C, and catalyst layer thickness of 4-10 cm. The life of catalysts, to be regenerated about every 4000 hours, is within a range of 10,000-14,000 hours. Thermal incineration requires thorough blending of the spent air with the combustion gases, a temperature range of 650-950 C, and contact times of 0.3-1.0 sec. Cracking products, formed at high temperatures, especially as applied for the drying of lacquered metal parts, may destroy the catalysts. The destruction of odorous substances presents the most difficult problem in lacquering facilities. Thermal incineration continues to be preferred to catalytic procedures, while afterburning devices are designed for new furnaces. Complex environmental protection is exemplified by a refrigerator lacquering shop where the organic solvent vapors from the 200 C-furnace are directly burned at 650 C, and the heat thus obtained is utilized to warm the air for the drying furnace. Costs are reviewed.

46102

Hestermann, Gerhard

SHOULD DRYING FURNACES POLLUTE THE AIR? AIR POLLUTION CONTROL AS SEEN BY LACQUERING EQUIPMENT MANUFACTURERS. (Muessen Trockner di Luft verpesten? Die Abliftreinigung aus der Sicht des

Lackieranlagenherstellers). Text in German. JOT, no. 1-2, Feb. 1971.

Technical and economic aspects of an emission standard for drying furnaces (maximum allowable concentration of 300 mg/cu m carbon are outlined. The spent air from drying furnaces in lacquering plants contains solvent vapors, coating materials, and crackling products. The bulk of these pollutants must convert into carbon dioxide or otherwise removed. Direct burning, especially in the case of high-temperature drying, is a universally applicable method. Cracking condensates in the drier can be prevented by increased air throughput. The spent air to be cleaned should be preheated to 300-600 C, and intense blending should be provided in the burning chamber. Temperatures of 700-800 C and a minimum contact time of 0.3 sec are usually applied. The cleaned air is used to preheat the spent air before releasing into the atmosphere at 200-400 C. Another technique, catalytic burning, has several advantages: no condensate is present, and the concentrations are higher than in the case of direct burning. The spent air should be preheated to 350-450 C, while the temperature rise over the catalyst is 100-600 C. The high-temperature cleaned air is used to preheat the fresh air. Direct burning equipment, operating at 600 C, may increase the production costs by 0.05%.

46138

Waid, Donald E.

THE SWEET SMELL OF SUCCESS IN POLLUTION ABATEMENT PROGRAMS. Ind. Gas, 52(7):14-17, July 1972.

Many industrial processes produce little that would offend the olfactory sense, but where odors are present, the most practical solution often is thermal incineration, utilizing a direct natural gas flame. This process is very effective in controlling certain air pollutants but should be restricted to those applications where it is desired to oxidize gaseous and fine particulate hydrocarbons to carbon dioxide and water vapor. Some of the most common odor producing processes and types of equipment that can be controlled with direct gas flame incineration are coffee roasters, core ovens, fat rendering, meat smokehouses, metal coating ovens, packing house effluents, paint baking ovens, varnish burn-off, varnish kettles, and wire enameling. Catalytic and flame incineration are described, as well as adsorption, wet scrubbing, and thermal incineration. Development of direct gas-fired thermal incineration is discussed, and design criteria are considered. Effluent velocity, pressure drop, amount of profile plate opening around the burner, combustion chamber considerations, and temperatures are mentioned as significant design parameters. Special considerations for odor control are included, and utilization of the heat produced is discussed. Advantages of the thermal process are cited.

46580

Black, J. W. C., R. M. Cooper, and D. T. Rattray

POLLUTION ABATEMENT IN THE CANADIAN PAINT INDUSTRY. Am. Paint J., 57(9):69, 72, 74-75, 77, Sept. 18, 1972. (Presented at the International Anti-Pollution Coating Seminar, 1st, Chicago, Ill.)

Various emission sources and pollution control methods within the Canadian paint industry are reviewed. Pollution potentials within the industry include air contamination from the emission of disagreeable odors associated with resin manufacture or emissions resulting from industrial application or curing of paint coatings; contamination of municipal sewer systems by waste products in plant effluents; disposal of miscellaneous solid and liquid wastes; and the use of materials considered hazardous to the environment. The manufacture of protective coatings may generate many potential atmospheric pollutants, with oils, resins, and solvents as the major components. Resin manufacture processes can emit fumes containing aldehydes, ketones, esters, alcohols, and phenols. The application of industrial finishes contributes to air pollution, with the curing of paint films as the main source. Evaporation and vaporization during the spraying of paint coatings also results in organic solvent losses. The major abatement techniques include the use of closed kettles within the operations, efficient scrubbers, reflux condensers, odor control through incineration, and restrictions placed on the type and quantity of solvents used in the industry. Canadian legislation and regulations are mentioned.

46598

Hultgren, Evert

EXHAUSTION ARRANGEMENT AND ENVIRONMENTAL CARE AT SPRAY PAINTING PLANTS. (Utsugningsanordningar och miljovard vid sprutmalning). Text in Swedish. Korros. Ytskydd, 7(1-2):25, 27, 1972.

Spray booths with exhaust systems for the separation of paint spray particles are described. Spray booths with labyrinth dry filter, separating paint particles on the centrifugal principle, have an efficiency of about 80%, and are not suitable for large-capacity surface-coating plants. New disposable filters reach efficiencies of 94-96%. Spray booths with water curtain between the booth and the exhaust, using water with pH adjusted to 10.5, have efficiencies above 99%. Cascade booth include powerful fan instead of pump for exhausting the air across cascade plates located in a water tank. Cascade booths with water curtain, operating in closed water cycle at efficiencies above 99%, are advantageous regarding the noise level. Spray booths for porcelain glaze are equipped with special water curtain with dry spray trap for the separation of some 80% by the spray trap and of 20% by the water curtain. Combinations of spray trap and bag filter with a total efficiency of over 99% are used mostly for large-scale operations. Spray booth waste gases, containing solvent vapors, can be evacuated by pipes led vertically downward with filter at their end, while large-capacity surface-coating facilities increasingly prefer catalytic afterburning for destruction.

47675

Baskin, B., D. J. Giffels, and E. Willoughby

POLLUTION CONTROL IN METAL FABRICATING PLANTS. In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 13, p. 13-1 to 13-22.

Threshold limit values, ventilation and pollution control, machining, surface finishing, heat treating, joining processes, finishing operations, surface coating, paint baking and stripping, air pollution control equipment costs, waste water treatment, and plant layout are discussed for the metal fabricating industry. Fundamental to any plant layout and planning considerations is the attitude of management, which must be predicted on the concept that the resolution of the plant pollution problem is an inescapable concomitant of the plant operation. The significance and the priority assigned to problems of atmospheric and industrial pollution control must be elevated to the status of the more directly related production factors such as good housekeeping, enforcement of proper safety practices, efficient material flow, production processes, and machine operations.

47686

Reichmann, Robert G.

POLLUTION CONTROL IN THE AEROSPACE AND ELECTRONICS INDUSTRIES. In: Industrial Pollution Control Handbook. Herbert F. Lund (ed.), New York, McGraw-Hill, 1971, Chapt. 19, p. 19-1 to 19-22.

The items produced by the aerospace and electronics industry are as diversified as the processes that are required to complete production. Though most plants in this field employ many processes similar to those used in other industries, certain special situations continually consume their time and energy. Since they are in the public limelight both locally and nationally, they must present a stronger public limelight image than most other industries. As they tend to deal with relatively new, exotic metals, they are faced with significantly difficult pollution problems. Some of the types of control agencies relevant to the aerospace and electronics industry which are found in a community are listed. Federal controls and codes, including military specifications, are mentioned. Conflict at the community level is considered. Safe working levels for mineral dusts and metallic dusts, fumes, and vapors, are presented. Dust collection methods includ electrostatic precipitators, filters, dry collectors and scrubbers. Community controls and codes pertaining to stack emissions are considered. Incinerator controls are indicated. Hydrocarbon pollution control is discussed, and a solvent classification is presented. A survey of aerospace-electronics manufacturing processes was conducted by a number of companies to determine which processes use hydrocarbon materials that may be effected by the Los Angeles solvent emissions regulation. Solvent control methods include carbon absorption, incineration, and solvent substitution. Methods available for the disposal of liquid wastes and the relevant codes and regulations are considered, as well as water conservation and reclamation. Plants handling or using radioactive materials are required under federal law to be licensed to permit their use.

47863

Dumon, R

THE FIGHT AGAINST SMELLS, A HARMFUL EFFECT OF A SOPHISTICATED WORLD. (La lutte contre les odeurs, nuisances d un monde raffine). Text in French. Chim. Ind., Genie Chim., 105(18): 1255-1260, Aug.-Sept. 1972.

General problems and possibilities of odorous emission control are reviewed. Incineration of odorous gases to water and carbon dioxide, possibly using additional fuel, should be done at a minimum temperature of 900 C. Catalytic odor destruction is used in petroleum refineries, in surface-coating shops, and in formaldehyde, plastic, and printing ink manufacturing plants. Scrubbers using water with added oxidizing or neutralizing agent are suitable for combined deodorization and dust removal. Adsorption on activated carbon, alumina, or silicagel is applied to waste gases with low concentrations (1-5 ppm) of odorous substances. Masking can be applied under certain conditions for nontoxic odorous substances. Ozonization is highly effective for odorous emissions from e.g., phenol and synthetic rubber manufacturing plants and from fermentation processes.

48096

Schneider, H. J. and Robert L. Price

POLLUTION: COPE WITH IT OR AVOID IT PART 2--AIR POLLUTION. Ind. Finishing (Indianapolis), 48(10):12-14, Oct. 1972.

Many parts of the country are adopting Los Angeles County Rule 66 to control air pollution from metal cleaning and pretreatment operations. Under this rule emissions from bake-cured organic compounds must be reduced by 90% or else must not exceed 15 lb/day/machine. Photochemically reactive solvents emissions must be reduced by 85% or else held to less than 40 lb/day/machine. To meet these regulations thermal incinerators must perform at 85% efficiency under varying loads of solvent mixtures and must be able to handle a wide range of organic emissions. Mutiple-stage and multi-purpose scrubbers for organic compounds are being investigated. The multi-purpose scrubbers hold the promise of lower cost, but contaminant reduction of some organic solvents appears impossible. Powder coatings and water-based coatings also help to reduce air pollution problems. Measures that will ensure an efficient control program are outlined.

48430

Weisburd, Melvin I.

PAINT AND VARNISH MANUFACTURING. In: Field Operations and Enforcement Manual for Air Pollution Control. Volume III: Inspection Procedures for Specific Industries. Pacific Environmental Services, Inc., Santa Monica, Calif., Office of Air Programs Contract CPA 70-122, Rept. APTD-1102, p. 7.15.1-7.15-18, Aug. 1972. 6 refs.

The paint and varnish manufacturing industry in a fairly broad context could be said to include synthetic resin manufacturing, varnish cooking, and paint blending processes. The major air pollutants from synthetic resin manufacturing would include emissions of monomers and other raw materials from storage and reaction vessels, sublimed phthalic anhydride and oil bodying odors from alkyd resin manufacturing, and possible solvent losses during thinning operations and storage of thinned resins. Varnish cooking involves a wide variety of odorous substances released during the polymerization and other chemical reactions that the natural drying oils enter into during the cooking process. These range from acrolein and other partially oxidized organic compounds to sulfur derivatives. Solvent losses may also occur in the thinning of varnish and in paint blending operations. Processes, air pollution control techniques, and inspection points are discussed. Control techniques include scrubbers, adsorption, flame and catalytic afterburners, and odor counteraction.

48437

Terlyanskaya, A. T. and L. P. Finogeyev

CATALYTIC PURIFICATION OF WASTE GASES FROM LACQUER AND PAINT PRODUCTION. (Kataliticheskaya ochistka otkhodyashchikh gazov proizvodstva lakokrasochnykh materialov). Text in Russian. Khim. Prom. (Moscow), 47(8):583-584, 1971. 2 refs.

A pilot-scale process for the catalytic purification of lacquer and paint manufacturing-generated waste gases containing acrolein, phthalic anhydride, and xylene is described. The throughput capacity was about 50 cu m/hr. The catalyst used is composed of 47-51% of copper oxide, 40-46% of chromium trioxide, and at least 2% of calcium oxide; the catalyst charge in the reactor is 1.5-3 l. The optimum conditions for the catalytic purification were determined to be a bulk speed of 30,000- 40,000/hr, a temperature of 370-390 C, and a combined organic contaminant concentration not higher than 3 mg/l (expressed in xylene). The efficiency was 76.4-96.4%. The waste gas to be treated was heated up by heat exchanger in utilizing the excess heat of the treated gas which is cooled to 100-115 C

C. MEASUREMENT METHODS

01333

A. Y. Ping, L. R. Clayton, T. E. McEwen, and J. S. Paydo

THE APPLICATION OF SILICA GEL IN SOURCE TESTING. PART I: COLLECTION OF SAMPLES. Preprint. (Presented at the 59th Annual Meeting, Air Pollution Control Association, San Francisco, Calif., June 20-25, 1966, Paper No. 66-79.)

The engineering of air pollution control deals with testing gas effluents for air contaminants and their concentrations. In this endeavor, the Bay Area Air Pollution Control District has developed and improved a technique of using silica gel adsorption tubes for determining test data on the organic compound emissions from commercial and industrial operations. This paper discusses a phase of source testing for such gaseous emissions from solvent-user operations. General details, involving the sample probe, sampling train, and pressure drops are included in the paper. Some typical test data and calculations are also given. (Author abstract)

03991

G. G. Esposito M. H. Swann

DETERMINATION OF AROMATIC CONTENT OF HYDROCARBON PAINT SOLVENTS BY GAS CHROMATOGRAPHY. J. PAINT TECHNOL. 38, (498) 377-80, July 1966.

The solvency characteristics of petroleum thinners for alkyd resins can be related to the amount of aromatic hydrocarbons present. Many other synthetic resins require thinners of high aromatic content and there is a need for a rapid, accurate analytical method that can be used for quality control. A procedure is described for the determination of aromatic solvents in petroleum thinners by gas-liquid chromatography (GLC) using a highly selective partitioning liquid. (Author abstract)

04143

T. Iritani and Y. Morishita

QUANTITATIVE DETERMINATION OF BENZENE TOLUENE, AND XYLENE IN SOLVENT AND IN AIR BY GAS-CHROMATOGRAPHY. Japan. J. Ind. Health (Tokyo) 2, (6) 56-67, June 1960. Jap.

The minimum determinable concentration of benzene, toluene, and xylene in solvents was found with gas chromatography to be 0.1% and the error was within 0.5% of the value determined. The quantitative determination of benzene, toluene, and xylene in air using colorimetry after separation by gas chromatography showed gross error and is of no practical use, because the vapors condensed near the outlet. When the air was supplied to the gas chromatograph without preparation, the minimum determinable value was about 75ppm for 10 ml of air, but 75ppm is too high, to be a desirable minimum value. To concentrate the air then, 1 liter of air was passed at the rate of 100 ml/min through a small column filled with 1 g of solid support (DOP) and cooled by dry ice; when the gases are attached to the inlet of the gas chromatograph and heated to 130 degrees C, a satisfactory gas chromatogram is obtained. When the vapor determination is made in air, the adequate column temperature is 100 degrees C instead of 125 degrees C (as with the analysis with solvents), since at 125 degrees C the vapors are not separated sufficiently from steam. In order to prevent disturbance by steam, phosphorus pentoxide must be put around the concentration column during air-sampling. Silica gel and a molecular sieve are inadequate as desiccating agents since they absorb benzene, toluene, and xylene as well as steam. This method proved reliable when air samples containing known quantities of the vapors were analyzed. The minimum determinable concentration by this method using 1 liter of air is approximately 2ppm for benzene, 4ppm for toluene, and 10ppm for xylene, and these are equivalent to about 0.003mV (4mm) in the peak height of gas chromatograms. Measurements can be taken in the field if the samples are taken into concentration columns with phosphorus pentoxide columns and tightly corked. (Author summary modified)

04742

H. Sakamoto and T. Kozima

RELIABILITY OF MEASUREMENT OF EVAPORATED BENZENE HOMOLOGUE CONCENTRATIONS WITH THE BENZENE-DETECTION TUBE. Japan J. Ind. Health (Tokyo) 3, (8) 419-2´ , Aug. 1961. Jap.

A study was made of the reliability of measurement with the benzene detection tube, widely used to measure the amount of benzene and its homologues in the air of workshops. The richer the benzene concentration in the air, the larger the probable error of the mean of obtained values, whereas the coefficient of variation of obtained values is at a minimum when a benzene detection tube is used. The same results were obtained in cases of toluene and its mixture with benzene in the air of workshops. When the benzene-like mist in the workshop air which evaporated from sprayed paint was examined, the values obtained with the benzene-detection tubes showed half of the values obtained by the sulfuric acid-formalin method. (Author summary modified)

05848

R. Goldstein and J. H. Elliott

EXPERIMENTAL PROGRAM FOR THE CONTROL OF ORGANIC EMISSIONS FROM PROTECTIVE COATING OPERATIONS (INTERIM REPT. NO. 5. DEVELOPMENT OF SAMPLING AND ANALYTICAL METHODS.) Los Angeles County Air Pollution Control District, Calif. Mar. 1960. 44 pp.

Analytical methods have been developed for the determination of low concentrations of solvent vapors emitted from protective coating operations. Organic compounds are detected and determined as CO2 in a nondispersive infrared CO2 analyzer after combustion. A chromatographic apparatus has been constructed to be used in conjunction with the combustion-infrared CO2 analyzer to determine low concentrations of organic vapors as CO2 in the presence of background concentrations of CO2 as high as six %. The development of a chromatographic procedure for the complete separation and quantitative determination of individual compounds in an effluent containing solvent vapors is in progress. (Author abstract)

08033

J. V. Pustinger Jr., and F. N. Hodgson

IDENTIFICATION OF VOLATILE CONTAMINANTS OF SPACE CABIN MATERIALS. Monsanto Research Corp., Dayton, Ohio, Contract AF 33(615) - 3377, Proj. 6302, Task 630202, AMRL-TR-67-58, 164p., June 1967. CFSTI, DDC: AD 658203

Ninety eight candidate materials for space cabin construction were tested to establish possible volatile gas-off and oxidation products. These materials could be potential cabin contaminants. Test conditions were designed to simulate the normal space cabin environment. After pretreatment at 0.1 torr and at 25 degrees C, candidate materials were stored in bench-scale simulators for 14 days at 68 degrees C, and for 30, 60, and 90 days at 25 degrees C, in a 5 psia oxygen atmosphere with 20-40% relative humidity. Individual components of the volatile contaminants were identified and the quantities evolved were estimated by gas chromatographic and mass spectrometric analyses. Paints and coatings, prepared immediately before testing, gave off considerable amounts of entrapped solvents. Lesser, but significant, amounts of contaminants result from oxidation and from hydrolysis. In some cases, larger increases in carbon monoxide levels were observed when the storage temperature was increased from 25 degrees C to 68 degrees C. In addition to the gas-off experiments, a cryogenic system for serial trapping of atmospheric contaminants was constructed. Gas chromatographic and mass spectrometric analyses were performed on four samples of atmospheres from bio-environmental systems. (Authors' abstract, modified)

08290

Kolk, Alvin L. Vander

SAMPLING AND ANALYSIS OF ORGANIC SOLVENT EMISSIONS. Am. Ind. Hyg. Assoc. J., p. 588-589, Nov.-Dec. 1967.

Stack emissions were evaluated for air pollution purposes by using both Mylar bag sampling and gas washing bottles contaning normal hexane and orthoxylene. Analysis was done by gas chromatography. Agreement between the two sampling techniques was good, and each method has its advantages and disadvantages. (Author0s abstract)

09751

Schmertzing, Hannibal and Julian H. Chaudet

UTILIZATION OF INFRARED SPECTROPHOTOMETRY IN MICROCONTAMINANT STUDIES IN SEALED ENVIRONMENTS. Melpar, Inc., Falls Church, Va., Contract AF 41(609)-1962, Task 793002, SAM-TR-67-2, 20 p., Jan. 1967. CFSTI, DDC: AD 650000

Microcontaminants in a sealed environmental system were separated and identified. The separation and identification of the collected samples were accomplished with gas-liquid chromatography and infrared spectrophotometry. Fifty-four sets of samples of the atmosphere from a space cabin simulator, comprising 162 individual samples, were analyzed. The method used was gas-liquid chromatography using a flame ionization detector. The retention time on the column was used for identification, while the peak area was used for quantitative estimation of the compounds. A collection of the vapor infrared spectra of 146 compounds, which are possible contaminants for space cabin simulators, has been compiled during 2 years. A computer program for sorting infrared spectra with the aid of the ASTM deck of infrared cards has been established. Analyses have been made of gases evolved from paint panels, from the decomposition of a Teflon insulator, and from human waste products.

11486

Petrova, M. S. and O. N. Shevkun

HYGIENIC ASSESSMENT OF ODOR OF NONMETALLIC BUILDING MATERIALS. ((K voprosu o gigienicheskoi otsenke nemetallicheskikh stroitel'nykh materialov po ikh zapakhu.)) Hyg. Sanit. (English translation of: Gigiena i Sanit.), 33(4-6):218-220, April-June 1968. ((2)) refs. CFSTI: TT 68-50449/2

Testers were first studied to ensure that they have a normal olfactory threshold (as described below). The testers then evaluated the odor of the building material under test (Vozhzhova and Denisenko). The odor of several coatings and other materials was tested. A varnish coating based on styrene with epoxy ester was tested for its odor 8 months after its application to the substrate. In the testing of a special adhesive with a phenolformaldehyde base, an olfactory sensation was produced by 0.6-0.8 ml air; i.e., it produced a 'moderate odor'. Every material tested by this method (taking into account the specified conditions of its envisaged use) may be categorized in terms of its odor. The method makes it possible to appraise the odor of new articles and materials at moderate cost and with simple equipment.

13081

Merz, Otto

PRACTICAL ANALYSIS OF WASTE GASES FROM ENAMEL PAINT DRYING FURNACES. (Praxisnahe Bestimmung von Abgasen aus Lacktrockenofen). Text in German. Abwasser, Abgas Schwebstofftechnik, Dechema Monograph., 59(1045-1069):199-207, Frankfurt am Main, Deutsche Gesellschaft fur chemisches Apparatewesen E.V., 1968. 12 refs.

Waste gases from enamel paint drying furnaces are complex mixtures of organic substances and small amounts (usually less than 1%) of gaseous pollutants developing during drying of bonding agents. Nothing is yet known about the composition of these gaseous pollutants, although an ordinance regulating the emissions of drying furnaces has been drafted in the West German state of North Rhine-Westphalia, stipulating that not more than 100 mg combustible substances/cu m be emitted with the waste gas. Thus, there exists an urgent need to determine the concentration of combustible gaseous pollutants. One such unit suitable for fast determination would be the so-called explosimeter, of which various types are available and which are highly sensitive. Multi-gas detectors, of which three varieties exist, are indispensable for such measurements. Qualitative evaluations can be carried out with the test tubes 'Qualitest' and 'Polytest'. The sensitivity of these units lies below the odor threshold. Both test tubes, which are by different manufacturers, react to many organic substances; however, coloration and intensities of the two units differ. They can be used for almost all solvants. Moreover, Polytest tubes may be also used for quantitative analyses. Such test tubes are manufactured for phenols, formaldehydes and sulfurous acids. They are suited for measurement in a temperature range of 0 to 40 C. With the phenol test tube, concentrations of 0.026 ppm can be measured. The measurement range of formaldehyde test tubes extends from 2 to 40 ppm. Concentration measurements of sulfur dioxide can also be performed. Such measurements are of importance when oil-fired drying furnaces are used. Test tubes for quantitative analyses of all gaseous hydrocarbons are still in the developmental stage.

13711

Sova, B.

A CONTRIBUTION TO THE DETERMINATION OF LACQUER PETROLEUM IN ATMOSPHERE. (Prispevek ke stanoveni lakoveho benzinu v ovzdusi). Text in Czech. Cesk. Hyg. (Prague), 13(1):54-58, 1968. 5 refs.

The nephelometric method appears to be a suitable one for the determination of lacquer petroleum vapors in the air, as it has sufficient sensitivity and reproducibility. The sensitivity of the method is unfavorably influenced by the presence of aromatic hydrocarbons. The higher the average molecular weight of the petroleum, the more intense the cloudiness. The composition of lacquer petroleum and related solvents for colors and lacquers changes, and therefore, a new calibration curve must be established for any special case. The petrol for colors and lacquers necessary for the calibration is obtained by means of vacuum distillation of the paint matter; at the same time the distilled liquid is substituted by a high-boiling compound distilled in the given conditions. (Author summary modified)

14476

Ixfeld, H.

METHOD FOR DETERMINING ORGANIC SUBSTANCES IN WASTE GASES. (Verfahren zur Erfassung organischer Substanzen in Abgasen). Text in German. Brennstoff-Chem. (Essen), 50(6):186-189, June 1969. 4 refs.

The method of Ixfeld and Buck for quantitative determination of organic substances in waste gases (with the exception of the hydrocarbons C1-C4) can be improved if the samples are carefully taken and prepared. This improvement is illustrated by the example of waste gases from a lacquer-drying stove. The waste gases from these stoves are usually cleaned in catalytic after- burners. The partially clean gases contain much higher fractions of CO2 (50 to 100 g/cu m) and water vapor (20 to 50 g/cu m) than the uncleaned waste gases. These high concentrations may have a considerable influence on hydrocarbon analysis by the Ixfeld and Buck method. To determine the magnitude of this influence, CO2 and synthetic air were mixed in a 1:1 ratio and freed of combustible organic substances. The gas mixture, cooled to room temperature and saturated with water vapor, was passed for 10 min through a silica gel tube. The tube was tightly sealed afterwards and left to rest for periods of up to 24 hrs. After that it was flushed for 5 min with nitrogen and desorbed. The desorbed CO2 quantity was proportional to the length of time the silica gel tube rested. The optimum resting period between the two flushings was 4 hrs. After this period, further reduction of the remaining CO2 content was found to be negligible. The nitrogen flushings did not influence analysis of the adsorbed organic substances. Similar experiments were conducted to determine the influence of H2O. So-called MN silica gel was used as the adsorbent and hexane as the organic component with synthetic air. The measurement errors increased with water content. Lowering of the gas throughput in the same sampling time brought no improvement. Aerosols can be better sampled if glass fiber filters are inserted ahead of the silica gel tube.

18133

Weigel, James E. and E. George Sabino, Jr.

SOLVENCY AND SOLVENT RETENTION STUDIES FOR COMPLYING VINYL SOLUTION COATINGS. J. Paint Technol., 41(529):81-88, February 1969. 11 refs.

Solvent systems for vinyl solution coatings have been significantly affected by the West Coast air pollution control regulations. Basic solvency information that has been developed to permit the formulation of complying vinyl systems is discussed. Data are shown which relate the composition of solvent systems to viscosity of vinyl chloride-vinyl acetate copolymer solutions. Solution properties of non-exempt and complying versions of vinyl solutions are compared. A gas-liquid chromatography method for the determination of retained solvents in dried films cast from these solutions is described. Data developed by this method is shown which relates solvent retention to solvent volatility. (Author Abstract)

20538

Franzky, Ulrich

EMISSION MEASUREMENTS ON DRYING OVENS AND JELLYING CHANNELS WITH SECONDARY WASTE-GAS PURIFYING PLANTS FOR ODOR ABATEMENT. Staub (English translation from German of: Staub, Reinhaltung Luft), 29(1):33-41, Jan. 1969. 9 refs.

Waste gases from ovens used for drying or baking colors have an intense odor due to the solvents and softeners emitted. For this reason, the government of North Rhine-Westphalia is limiting the carbon content of the combustible organic substances in undiluted, purified waste gas from drying ovens to 300 mg/cu m STP. A new technique will permit sampling for carbon concentrations between 100 and 300 mg/cu m STP. A heated probe aspirates a sample from the waste gas through a quartz tube filled with silica gel. The combustible organic substances are absorbed in the process. During subsequent treatment in the laboratory, the samples are desorbed in a flow of hot oxygen and combusted to carbon dioxide, the quantity of which is analytically determined. Emission measurements obtained by the method are reported for three polyvinyl chloride jellying channels and four continuous or quasi-continuous lacquer drying ovens. A plant that combined waste gas purification by catalytic combustion with waste-gas feedback achieved satisfactory reductions in the total amount of combustible substances present in the flue gas.

21717

Esposito, George G.

GAS CHROMATOGRAPHIC ANALYSIS OF LACQUER SOLVENTS CONTAINING NAPHTHA DILUENT. Coating and Chemical Lab., Aberdeen Proving Ground, Md., AMCMC Code 502E.11.29500, Proj. 1TO62105A329, CCL Rept. 274, 13p., Dec. 1969. 3 refs. CFSTI, DDC: AD 699324

Gas-liquid chromatography is used for the identification and determination of lacquer solvents, as certain solvent types used in surface coatings tend to form free radicals when exposed to solar radiation. A column prepared from two very polar liquid phases, diethylene glycol succinate and N,N-Bis(2-cyanoethyl)formamide, will elute aliphatic solvents quickly, permitting the identification and determination of oxygenated and aromatic solvents which appear as well defined peaks in the latter part of the chromatogram. Distillation of solvent from the lacquer is required as a preliminary step and final analysis can be calculated on a weight or volume basis.

25514

Belisle, Jon W.

AIR TESTING PROCESS. (Minnesota Mining and Mfg. Co., St. Paul) U. S. Pat. 3,533,750. 3p., Oct. 13, 1970. 2 refs. (Appl. Oct. 16, 1967, 7 claims).

A method for detecting low concentrations of aromatic isocyanates or aromatic amines is described, which comprises introducing a sample of air into an impinger containing an acidified aqueous test solution containing glutaconic aldehyde, and a particulate cation exchange resin whereby a visible color change occurs. In recent years, the application of toluene diisocyanates has become increasingly important in the general field of synthetic chemistry and in the manufacture of adhesives, protective coatings, foams, fluid polymers, and urethane plastics. The observable color formation which takes place on the resin particles is an orange-red which is directly related to the amount of amine present.

26966

Kaiser, Elmer R.

ODOR AND ITS MEASUREMENT. In: Air Pollution. Arthur C. Stern (ed.), Vol. 1, New York, Academic Press, 1962, Chapt. 15, p. 509-527. 21 refs.

Part of the air pollution problem of all sizable communities is the presence of gases and vapors in the atmosphere that offend the sens of smell. The amazing sensitivity of olfactory reception is apparent from the fact that a sniff of 50 cc of air containing only 2 times 10 to the minus 9th power mg of mercaptan serves as an adequate odor stimulus. The first requirement for odor measurement is a definable and reliable yardstick. An individual perception threshold and a population perception threshold are discussed. A group of three, five, or more trained observers, each with at least an average keenness of smell, and who will follow prescribed rules, can make valuable odor determinations. The organoleptic panel technique is described, as well as the sampling of odorized air or gas. The most satisfactory determination of odor concentration is by dilution of a sample with odor-free air until the perception threshold is reached. A simple procedure of the American Society for Testing Materials is outlined. An odor evaluation apparatus has been devised by Nader, which utilizes the perception principle with continuously proportioned streams of odorous air and odor-free air. Factors affecting odor perception include concentration of th odorant in air, odor fatigue or adaptation, humidity, and temperature. Odor sources most frequently reported to air pollutio control agencies are presented tabularly, as well as the minimum concentration for positive perception of a large number of compound Odor masking and counteraction are discussed, including the cost of odor treatment.

28393

Lang, Oskar and Thorkill zur Muehlen

AIR POLLUTION BY ORGANIC ACIDS AND ESTERS AND THEIR ANALYTICAL DETERMINATION. (Luftverunreinigung durch organische Saeuren und Ester und deren analytischer Nachweis). Text in German. Zbl. Arbeitsmed., no. 2:39-45, Feb. 1971. 25 refs.

Odor emissions are frequently traced to organic acids and their esters, concentration of which can be photometrically determined with the hydroxamic acid reaction. An impinger (volume 100 ml) with 50 ml saturated barium hydroxide solution is used for sampling Sampling speed is 1.8 to 2.0 cu m/hr. The pollutant to be measured is absorbed on a 10-cm layer of silica gel. The silica gel is then extracted for 30 min with 15 ml ether. For analysis, 10 ml ether solution is mixed with 2 ml diazomethane solution and the mixture heated to the boiling point. After cooling, 3 ml hydroxylamine solution is added and the mixture heated again for 10 min. The extinction is measured and compared with a control solution. The method was used to measure ricinolic acid in the waste gas of a lacquer drying oven; a concentration of 0.6 mg/cu m was measured. The method was also used for measuring methylcyclohexylacetate and for measurements at an acetylation plant.

31240

Jensen, Soren

PCB AS CONTAMINANT OF THE ENVIRONMENT - HISTORY. National Swedish Environment Protection Board, Solna, Proc. PCB Conf., Stockholm, Sweden, 1970, p. 7-17. (Sept. 29.)

The history of PCB began in 1929 when it was introduced as a nonflammable oil in electrical transformers, condensers, and in paint. Today, it is almost as widespread as DDT. Due to its non-degradability, PCB wastes will remain in the environment for a considerable length of time. It was recently discovered that most of the unknown components from pesticide analysis of wild life samples were PCB. In analyzing residues for PCB, the pesticides must be extracted from the biological material, followed by a careful clean-up to remove interfering substances. The PCB can then be identified by gas chromatography, thin layer chromatography, and mass spectrometry. Once identified, quantitative analysis of the PCB can be accomplished.

31924

Baba, Yoshio

MEASUREMENT/ANALYSIS OF ODOR AND TECHNIQUES OF OFFENSIVE ODOR PREVENTION. (Shuki no sokutei bunseki oyobe akushu boshi gijutsu). Text in Japanese. Preprint, Smaller Enterprises Promotion Corp. (Japan), 60p., 1971. (Presented at the Public Nuisance Prevent. Tech. Seminar, Japan, 1971.)

Odors can be measured by a human panel procedure or with analytical apparatus; the former method is used primarily to determine the intensity of an odor and/or kinds of odors, while the latter method is more often used for the analysis of substances giving a particular smell. Odorants which exist in extremely small quantities can now be detected by gas chromatographic analysis. However, it is still difficult to correlate the detected odorants and the unpleasant odor they are believed to cause. Various olfactory tests are cited. Deodorizing techniques include combustion, scrubbing, adsorption, oxidation, masking, neutralization, and a chemical deodorization method. The preventive measures implemented at the source of odor generation are cited for oil refineries, Kraft pulping, petrochemical processes, chemical processes, painting and printing industries, slaughterhouses, pig and poultry farming, and diesel or jet engine exhaust. The analysis methods are given for acrolein, formaldehydes, acetaldehyde, mercaptans, benzenes, hydrogen chloride, ammonia, and hydrogen sulfide.

33045

Triplett, Gary

ESTIMATION OF PLANT EMISSIONS. Preprint, p. 15-27. 1970 (?). 21 refs.

There are times when it is not possible or practical to determine emission rates by stack sampling; in these cases emission rates may be estimated by utilizing available emission factors. An emission factor is the statistical average of the mass of contaminants emitted/unit quantity of material handled, processed, or burned. The emission factor may also be expressed as the quantity of contaminant/unit quantity of final product or effluent volume. These factors have been developed through stack testing or by material balance calculations. Emission factors are normally given in terms of uncontrolled emissions. Therefore, the type and effectiveness of control equipment must be considered when calculating emissions from controlled sources. Particle size distribution and effective stack height should also be considered. Emission factors are given for coal, fuel oil, natural gas, and wood burning;

solid waste disposal; incinerators; paint manufacturing; the food and agriculture industry; primary metallurgical processing including iron and steel manufacturing, open hearth furnaces, basic oxygen furnaces, electrical arc furnaces, and blast furnaces; smelting and foundries for aluminum, brass, lead magnesium, steel, and zinc; mineral processing of asphalt, calcium carbide, cement, concrete, glass and lime; petroleum production, and the kraft pulp industry. (Author abstract modified)

37128

Selheimer, C. W., William Muttera, Fred Zavasnik, and Rudolph Novak

ANALYSIS OF FUMES BY SELECTIVE ADSORPTION (CHROMATOGRAPHY). Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):595-615, Aug. 1954. 5 refs.

As part of a program to find a fume control method applicable to the entire paint and varnish industry, sampling apparatus consisting of an air cooled condenser with trap, water cooled condenser with trap, water jacketed scrubber, air trap, calcium chloride drying tube, dry ice-acetoned cooled condenser with trap, modified Orsat gas analysis equipment, dry gas test meter, vacuum gage, pump, and gas sampling tank was tested on three different processes: tall oil-glycerine, linseed oil bodying, and castor oil-tall oil dehydration. Fume sampling runs were made on each of the three processes on a full scale plant basis, while small scale laboratory runs were made on the tall oil-glycerine and linseed oil bodying processes. The plant and laboratory runs were compared on a basis of peak fume load and material condensed. A preliminary separation was performed on material condensed in the dry ice trap from a tall oil-glycerine run using selective adsorption and results indicate feasibility of this method.

37151

Selheimer, C. W. and Robert Lance

ANALYSIS OF FUMES LEAVING RESIN KETTLES AND FUME ABATEMENT EQUIPMENT. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):711-768, Aug. 1954. 180 refs.

Infrared spectroscopy was successfully used to identify types of compounds in the fumes emitted during the various cooking operations in the paint and varnish industry. In particular, heat bodying of linseed oil and alkyd resin manufacture was studied. The linseed oil heat bodying reaction emits fumes primarily containing aliphatic carboxylic acids, esters, and aldehydes. Pure paraffins and olefins are also present. Analyses by both infrared and mass spectroscopy of the fumes leaving a multi-wash collector prove that the odorous materials exiting to the atmosphere are present in extremely small quantities. The fumes which condense as a liquid may be separated into their respective components by employing the techniques of chromatography. A catalytic combustion unit was tested and performed at 89 and 98%. In addition, the combustion unit releases to the atmosphere only one-third to one-sixth the total weight of uncondensables released by the wash system for comparable cooking operations. (Author conclusions modified)

37155

Selheimer, C. W., Robert Lance, Allen Weinberg, and Donald Brown

ANALYSIS OF FUME CONSTITUENTS BY CHROMATOGRAPHY, WITH PRELIMINARY SEPARATION BY FRACTIONAL DISTILLATION. Off. Fed. Paint Varn. Prod. Clubs., 26(348):653-663, Aug. 1954. 14 refs.

Previous work on fume control in the paint and varnish industry demonstrated the possibility of separating the dry ice condensate fraction of fumes from the tall oil-glycerine esterification by chromatographic methods. The method was extended to the analysis of all the condensate fractions from the same reaction. As a further step in the physical separation of the condensates, a laboratory fractionating column equivalent to 60 theoretical plates was set up and used. The silica gel-isopropanol system previously used on the dry ice condensate would not make the separation on the other fractions collected, but Attapulgus clay did separate all the condensates; in addition, results obtained checked the silica gel separation of the dry ice condensate. Initial preparation of adsorbent is critical if consistent results are desired. Fine mesh clay is necessary for good separation, since coarse particles cause channeling and poor separation. Cooling water in the column jacket speeded up separation time from several weeks to seven hours. Gas pressure also accelerated the separation. Small auxiliary columns were used to obtain preliminary information on adsorbent-effluent systems. Fractionation of water layers indicated minute amounts of organic materials in solution. Condensates from water and air-cooled condensers were quite similar to kettle raw materials, both by odor and analysis. (Author abstract modified)

37584

Betz, Erwin C.

IMPURITY DETECTOR FOR GASEOUS STREAMS. (Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,567,394. 4p., March 2, 1971. 3 refs. (Appl. May 16, 1968, 3 claims).

The multi-column gas chromatographs generally used to detect impurities in a gaseous atmosphere require considerable floor space, close operating control and skill, and long sample probes. The invention provides a small, simple, and reliable instrument for transporting, measuring, indicating and/or recording continuously the impurity concentration in a gaseous stream. A known impurity stream and an unknown impurity stream are passed through parallel conversion zones, preferably catalytic, to produce separate conversion product streams. The product streams are then passed through detectors that generate signals which correlate quantitatively with the impurity content of the unknown stream. Suitable catalysts are metal oxides, e.g., copper oxide; suitable detectors are thermal conductivity cells, infrared analyzers, and hydrogen flame ionization detectors. Applications of the instrument include the detection of hydrocarbons in exhaust gases from drying ovens, vents from paint and varnish applications, catalyst regeneration facilities, and internal combustion engines. The performance of control devices for these exhaust streams can be evaluated with the instrument.

39244

Adamiak, J.

COLORIMETRIC DETERMINATION OF CYCLOHEXANONE IN THE PRESENCE OF ACETONE IN AIR. (Kolorymetryczne oznaczaniecykloheksanonu w obecnosci acetonu w powietrzu). Chem. Anal. (Warsaw), 1[illegible]4):895- 900, 1968. 8 refs. Translated from Polish. National Leading Library for Science and Technology, Yorkshire (England), Russian Translating Programme, 9p.

The colorimetric determination of cyclohexanone in the presence of acetone in air is described. Both cyclohexanone and acetone are used in the paint and lacquer industry as a solvent for nitro and polyvinyl paints, and both occur simultaneously in solvent-polluted air. The method is based on the coupling of cyclohexanone with a diazonium salt of hydrogen acid in an alkaline medium of sodium hydroxide and sodium sulfite or bisulfite. Absorption determinations are carried out by spectrophotometry.

39491

Selheimer, C. W. and Howard Bauman

FUME ANALYSIS AND PROCESS DESIGN CALCULATIONS. Off. Dig. Fed. Paint Varn. Prod. Clubs, 26(348):574-594, Aug. 1954. 9 refs.

The development and use of two procedures for the analysis of fumes from paint and varnish manufacturing processes are presented. In the first procedure, water scrubber and water condenser fractions are combined and then separated into oil and water layers. After a sodium fusion test, litmus paper tests, and solubility tests, the oil layers and water layers are separated into solubility classes. The second procedure is a simplified sampling and analysis scheme that yields data from which the effectiveness and cost of the common fume disposal systems can be calculated for any given process.

43890

Merz, Otto

INFORMATIVE MEASURING WITH GAS TEST TUBES IN AIR AND OVEN DRYING. (Orientierende Messungen mit Gaspruefroehrchen bei Luft- und Ofen- trocknung). Text in German. Staub, Reinhaltung Luft, 31(10):399- 401, Oct. 1971. 7 refs.

Testing with gas test tubes has been known since 1934 under the names of chromometry and chromogrametry. It is based on the discoloration of chemical reagents on a carrier material by the substance to be tested. A predetermined volume of the atmosphere to be tested is being aspired by a suction pump through the gas test tube. The discoloration occurs on an indicating layer of the gas test tubes, whereby the intensity of color and the length of the discolored part of the layer correspond to the concentration of the gas or vapor. The sensitivity of these tubes lies below the smelling threshold. The tubes are suitable for measurements up to 40 C, so that waste gases above this temperature must be cooled before being tested. Phenol, formaldehyde, sulfur dioxide and ammonia are the substances of principal interest in connection with oven drying. Test tubes for phenol show a blue discoloration and have a measuring range up to 5 ppm. For formaldehyde, the discoloration is reddish, and the measuring range of the tubes is 2 to 40 ppm. The results obtained with this method in a plant for sheet metal packing materials coated with varnish, where oven drying and catalytic afterburning are included in the operation, are reported.

47952

Muehlen, Th. zur

DETERMINATION OF THE SOLVENT VAPOR CONCENTRATION IN AIR. SAMPLING AND GAS CHROMATOGRAPHIC ANALYSIS. (Bestimmung von Loesungsmitteldampf-Konzentrationen in Luft. Probenahme und gaschromatographische Analyse). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 22(9):264-276, Sept. 1972. 24 refs.

Solvent vapors are frequent air pollutants. They develop during cleaning, degreasing, lacquering, coating, production of chemical and pharmaceutical products, and production and processing of synthetics. Solvent vapors do not only contaminate the air over the working places, but they also emit and annoy the neighborhood with emissions. The sampling gas collection probes were used mainly for determination of working place concentrations. Furthermore, adsorption on silica gel and adsorption in solvents were suitable methods. The latter two sampling methods can be combined with the method of collection of the gas sample in a tube which is sealed after 20 to 30 l air have been pumped through. The adsorption method has been successfully applied for determination of solvent vapor mixtures in the waste air emitted by a lacquer manufacturing plant. The method was tested for determination of methanol and acetone vapors in the waste air of a coating station. The measured emission concentrations agreed well with the calculated concentration of about 15 g/cu m which was obtained from the applied solvent quantity and the waste air quantity. The adsorption method was also successfully applied for the determination of emission concentrations. Through the use of two adsorption tubes connected in parallel, plus a higher air throughput the ethylene acetate, i-butanol, and toluene emissions between 0.1 and 0.5 ppm in the vicinity of a lacquer production plant could still be measured. The three sampling methods are described in detail as is the calibration of the gas chromatographic equipment for the analysis of the gas samples from the gas collection tube or the solutions from the absorption method.

D. AIR QUALITY MEASUREMENTS

00081

R.T. Arnest

ATMOSPHERE CONTROL IN CLOSED SPACE ENVIRONMENT (SUBMARINE). Naval Medical Research Lab., New London, Conn., Bureau of Medicine and Surgery, (Rept. No. 367.) Dec. 14, 1961. 39 pp. CFSTI, DDC: AD 270896

The purpose of this work was to make a general summary of the toxicological problems associated with the closed space environment of submarines and to review the current state of development of tools for measuring and removing the problem substances involved. More than twenty-five atmospheric contaminants are listed, their sources, and their maximum allowable concentrations (MAC) are given, as well as the symptoms they cause, the long-term effects; tools for measuring the amounts of contaminants present are described and methods of removal indicated, in so far as known.

10128

G. Swanson

MICROSCOPICAL ANALYSIS OF SUSPENDED PARTICULATES IN DENVER AIR POLLUTION. In: Further Studies of Denver Air Pollution. Colorado State Univ., Fort Collins, Colo., Dept. of Atmos- pheric Science, AS-105, p. 109-145, Dec. 1966. 14 refs.

Results of microscopical analysis of suspended particulates in the Denver air are discussed. The study was a preliminary on in to evaluate the feasibility of identification of suspended particulates in situ. The major sampling site was located close to the center of the city of Denver. The greatest density of potential sources lies in a northerly and northeasterly direction from the sampling site. Located in the area are pulverized-fuel users, refinery operations, ceramic tile manufacturers, feed pro- cessing operations, fertilizer plants, paint manhfacturers, oil combusters, and paper processing plants. Suspended atmospheric particulates were collected on a 47 mm (960 mm2 effective area, Millipore ADM-30, 1966) membrane filter, pore size 0.45 micron. The filter was retained in a stainless steel 'open-type' filter holder containing a 10 liter per minute limiting orifice. The analysis relied on morphological identification and simple chemical microscopical techniques. It was found that wind changes and inversion conditions affect the composition of sample as well as the size distribution.

32259

Hidy, G. M., S. K. Friedlander, and W. Green

BACKGROUND INFORMATION ON SITE AND METEOROLOGICAL EXPERIMENTS. PASADENA SMOG EXPERIMENT. In: Aerosol Measurements in Los Angeles Smog, Vol. I, Section II. Minnesota Univ., Minneapolis, Particle Technology Lab., Particle Lab. Pub. 141, Air Pollution Control Office APTD-0630, PHS Grant AP-00680-02, 18p., Feb. 1971. 14 refs. NTIS: PB 198816

The general character of the observational site, an inventory of sources, and the meso-scale meteorology of the Los Angeles basin are presented. The physical site in Pasadena is described in detail and a brief summary of the meteorological instrumentation and support of the program is presented. Typical stationary sources producing a variety of pollutants include chemical processing equipment, boilers and heaters, paint bake ovens, incinerating equipment, melting equipment, and power plants. The power plants release mainly nitrogen oxides to the atmosphere. Typical contaminant concentration levels are listed for the summer months in West San Gabriel Valley. The broad scale features that characterize Los Angeles weather are the Pacific high pressure zone which dominates the synoptic scale atmospheric motion from early spring to early fall, the continental high pressure region over the deserts and high plains to the east and north which is present most of the period from fall through winter, and the winter passage of cyclonic storms originating to the north, south, and west over the Pacific. In addition to direct observations made from the roof of Keck Laboratories, several parameters were recorded from local sources. Some meteorological charts and data on emissions and meteorological instrumentation are included.

35437

FINAL REPORT ON THE EMISSIONS INVENTORY FOR THE STATE OF ALABAMA. TRW Systems Group, McLean, Va., Washington Operations, Office of Air Programs Contract 68-02-0048, 93p. Aug. 1971. 33 refs. NTIS: PB 203467

Under the Clean Air Act of 1970, as amended, each state is required to submit a plan for the implementation and enforcement of national ambient air quality standards for each air quality control region in the state. An initial requirement for each of these plans is an emission inventory for each designated region. The Alabama Emission Inventory is summarized in charts and tables that serve as a guide to control strategy development and selection. Point source data required for preparation of the report were obtained from questionnaires and follow-up contacts with individual sources; area source data were obtained from various governmental agencies and personal contract with knowledgeable individuals. All data were transferred to prepared computer load sheets and processed by the Environmental Protection Agency inventory computer program. The Metropolitan Mobile and Birmingham areas were divided into grid networks for the purpose of apportioning the emissions in these areas. All other emission totals are reported by political jurisdiction and region. Sources included coal boilers and burners, fuel oil burners, natural gas boilers, open burning, incineration, solvent evaporation, diesel engines, railroads, ships, gasoline motor vehicles, surface coating, petroleum refining and distribution, wood burning, solid waste disposal, pulp mills, and power plants for residential, industrial and commercial areas. Sulfur dioxide, carbon monoxide, hydrocarbons, particulates, and nitrogen oxides were measured.

36910

Hoshika, Yasuyuki, Tomohiko Ishiguro, Yoshiyuki Katori, Shinobu Futaki, and Yoshihiro Shigeta

AN EXAMPLE OF INVESTIGATION METHODS FOR ODOR POLLUTION. (Akushu kogai chosa no jirei). Text in

Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 6(1):227, 1971. (Presented at the National Council Meeting of Air Pollution Studies, 12th, Nagoya, Japan, Oct. 27-29, 1971.)

Upon complaints from residents in the surrounding area of a small- scale doll manufacturing plant, the odor concentration was measured by the organoleptic panel technique and the odor syringe method. The odorant concentration was measured by gas chromatograpy. Thy paint thinner and styrene type odors were detected, and the odor concentration was 10-300 at the source and 2-10 in the surrounding area. Methyl, ethyl, and n-butyl acetates, toluene, benzene, and ethylbenzene were identified, however, the concentrations were below the positive perception level.

41887

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

SUMMARY. In: Helena Valley, Montana, Area Environmental Pollution Study, Pub-AP-91, p. 1-23, Jan. 1972. NTIS: PB 207126

The history, topography, climatology, population statistics, industry, and agricultural activity of Helena Valley, Montana, are reviewed. Air, water, and soil were examined for contamination by arsenic, cadmium, lead, and zinc. In addition, airborne sulfur dioxide was measured. Pollutant effects on vegetation and accumulation of heavy metals in hair, organs, and edible animal tissue were studied. The exposure of area residents to heavy metals was reflected by elevated concentrations of arsenic, cadmium, and lead in the hair of fourth-grade school boys. Pollution sources from lead smelting, slag processing, and paint pigment production were surveyed. Meteorology and source-receptor relationships were examined, including atmospheric stability and temperature inversions, and diffusion estimates of short-term SO2, long-term SO2, and particulate matter. Ozone and nitrogen dioxide levels were also studied.

E. ATMOSPHERIC INTERACTION

25527

Levy, Arthur, William E. Wilson, Jr., and Salo E. Miller

SOLVING THE RIDDLE OF SMOG. Battelle Res. Outlook, 2(3):17-20, 1970.

Although knowledge of the chemistry of smog is incomplete, oxidant and hydrocarbon criteria estabilshed by the National Air Pollution Control Administration form a basis for the effective regulation of smog in Air Quality Control Regions. The criteria are 0.1 ppm for average one-hr oxidant concentrations and 0.3 ppm for average one-hr hydrocarbon concentrations. With appropriate research and development and intelligent use of the results, control can be achieved and regional standards simultaneously upgraded. In this connection, smog chambers are valuable tools for researching the photochemical smog process and evaluating control schemes. Their use by the petroleum and paint and solvent industries is cited as a sound approach to resolving photochemical smog and controlling it.

F. BASIC SCIENCE AND TECHNOLOGY

08558

Hamming, Walter J.

PHOTOCHEMICAL REACTIVITY OF SOLVENTS. S.A.E. (Soc. Automotive Engrs.), Preprint 670809, 14p., 1967. 5 refs. (Presented at the Aeronautic & Space Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 2-6, 1967.)

Evaluative studies of relative photochemical reactivities of various organic solvents for purposes of emission control are reported. Solvents include olefins, xylenes and other aromatics of comparable weight, toluene, branched ketones, tri- and tetrachloroethylene; benzene, and saturated halogenated hydrocarbons. Criteria used to judge relative photochemical reactivity were mainly eye irritation and ozone formation. Initial judgments based on these standards were also invluenced by aerosol formation, aldehyde production, and effect of test substances on rate of conversion of NO to NO2. The results of the entire study show clearly that xylene is more reactive than toluene and some olefins. However, the latter, as a group, appear to have the greatest photochemical reactivity of all hydrocarbon types. Normal ketones, such as methyl ethyl ketone, are slightly reactive, but branched ketones, such as methyl isobutyl ketone, are somewhat more reactive than their normal isomers. Chlorinated ethylenes, except perchloroethylene, appear to be photochemically active to a degree roughly comparable with branched ketones and toluene. Alcohols and aldehydes are less reactive than toluene; and branched hydrocarbons, cyclic paraffins, and normal paraffins, still less so. Benzene, perchloroethylene, saturated halogenate hydrocarbons and acetone appear virtually unreactive. The results of this study clearly demonstrated that both the quantity of organic solvent emissions in Los Angeles County and their overall photochemical reactivity were such that a reduction was necessary. The results of the studies were utilized to construct Rule 66 for the control of organic solvent emissions in Los Angeles County.

37564

Low, Manfred J. D. and Howard Mark

INFRARED FOURIER TRANSFORM SPECTROSCOPY IN THE COATINGS INDUSTRY. I: INFRARED SPECTRA OF CLEAR COATINGS ON METALS. J. Paint Technol., 42(544):265-275, May 1970. 8 refs. (Presented at the Federation of Societies for Paint Technology, Annual Meeting, 46th, New York, N. Y., Oct. 25, 1968.)

The use of Fourier Transform spectrometers to measure infrared spectra is becoming more widespread, and it seems likely that the high sensitivity, speed, and versatility of these instruments can be used to advantage in the coatings industry. The principles of Fourier spectroscopy are briefly outlined and some exploratory measurements of infrared spectra of clear coatings on metals are described. The Fourier Transform spectrometer does not have a monochromator. Dispersion of filtering is not required, so that energy-wasting slits are not needed. The throughput, the amount of radiation which can enter the optics of the Fourier Transform spectrometer, is quite large in comparison to that of a conventional spectrometer. In the conventional spectrometer, each radiation bundle or resolution element of the spectrum is scanned across the detector. Consequently, if there are M resolution elements, the intensity of each element is measured for only a fraction T/M of the total scan time, T. The signal proper is directly proportional to the time spent observing it, while noise, being random, is proportional to the square root of the observation time. The S/N is then proportional to (T/M) to the 1/2 power. With the interferometer, however, the entering radiation falls on the detector, so that each resolution element is observed throughout the entire scan period, with the result that S/N is proportional to T to the 1/2 power. (Author abstract modified)

37580

Low, Manfred J. D. and Howard Mark

INFRARED FOURIER TRANSFORM SPECTOSCOPY IN THE COATING INDUSTRY II. OPTICAL SUBTRACTION. J. Paint Technol., 43(553):31-41, Feb. 1971 12 refs.

The operation of a Fourier Transform spectrometer in the dual-beam, optical subtract mode offers the advantages of higher sensitivity and, in suitable cases, infrared spectra can be recorded quickly. Conversely, it is the inherent high sensitivity of the method itself which leads to some experimental difficulties, because the optical balance of the system can easily be destroyed. Fortunately it is possible to eliminate or alleviate instrument drift of the type encountered and to improve instrument performance and sensitivity through the use of better and more appropriate components than were available. Optical subtraction probably can be developed into an attractive technique for differential reflection measurements, film thickness determinations, and especially the measurement of infrared transmission spectra of very small amounts of samples. The use of such instruments to record infrared spectra of coatings and microsamples, and to measure film thickness, is outlined. (Author summary modified)

G. EFFECTS-HUMAN HEALTH

00776

M.B. Jacobs L.J. Goldwater

ABSORPTION AND EXCRETION OF MERCURY IN MAN. VIII. MERCURY EXPOSURE FROM HOUSE PAINT. - A CONTROLLED STUDY ON HUMANS. Arch. Environ Health Vol. 11:582-587, Oct. 1965.

When paints containing a mercury-bearing preservative were used, mercury vapor was elaborated. It reached a value of 0.17 mg/cu meter in about 90 minutes. It stayed at this concentration level for about two hours and then fell to 0.01 mg/cu meter in 24 hours. The total mercury concentration was of the order of 0.02 mg/cu meter for about 4 1/2 hours. 2. After 24 hours with no exceptional attempts at ventilation the concentration of mercury decreased to an insignificant level. 3. Some mercury was absorbed by persons exposed to the vapors. Urinary concentrations were no greater than those found in unexposed 'normal' persons. 4. Painters using mercury-bearing paints showed no evidence of absorption or effects of inhaling the concentrations of mercury found in the workroom air. 5. No evidence was found of mercury exposure or absorption in a degree that would constitute a hazard to the painters or to the occupants of the painted room. (Author summary)

01559

T. Karoly

DANGER OF FIRE, EXPLOSION, AND HEALTH - DETERIORATION WITH VARNISHING AND PAINTING. PART II. A Lakkozas-Festes Tuz, Robbanas-es Egeszsegveszelyei II. Resz. Gepgyartastechnologia (Budapest), 6(8):354-358, Aug. 1966.

Density, period of exposure and poisoning power are functions of the deleterious action to the organism of various pigment dusts and loading materials found in the dyestuff industry. Toxic tolerances of these poisonous materials are given. Methods to avoid over-exposure to these materials are described. It was concluded that the concentration of the most commonly used inflammable liquids in the dyestuff industry should not exceed 0.5 vol. % in the working space.

03654

J. Steel

TOXIC HAZARDS IN THE MANUFACTURE AND USE OF SURFACE COATINGS. Paint Technol. (London) 30(11):26-28, 30-4, Nov. 1966.

The recognition of the hazards inherent in the handling of more than 2000 raw materials in a prerequisite for any program to promote healthy working conditions among the 50,000 workers involved in the manufacture of paints, varnishes, lacquers, and printing inks. The maximum allowable concentrations assigned by the British Ministry of Labour are given for a large number of materials used in the manufacture of paint. Although there has been a steady decline in the incidence of lead poisoning over the last few decades, one sixth of the 407 cases in the 1960-1964 period were caused by the manufacture and industrial use of lead paints, enamels, and pigments. The problems of the newer hazards such as tolylene diisocyanate which because of its potential for sensitizing action has required an extremely low M.A.C. of 0.02 ppm are discussed. The hazards from the degradation of surface coatings during burning or cutting operations are discussed. The application of research to the development of safer paints is advocated. Any toxic hazard involved in the manufacture or use of surface coatings can be controlled.

04142

S. Sato

RESULTS OF A HEALTH EXAMINATION ON BENZENE WORKERS AND THE EFFECT OF THIOCTIC ACID. Japan. J. Health (Tokyo) 2, (6) 35-41, June 1960. Jap.

Decreased blood cell counts and positive urobilinogen were found in a health examination in a few of the 17 workers engaged in painting with benzene mixtures. Positive albuminuria and coproporphyrinuria were not found in any of them. The examination included counts of red and white blood cells, tests of protein, urobilinogen and coproporphyrin in the urine. Subjective symptoms such as feelings of fatigue, headache, vertigo, general weakness, and intestinal disorders were reported in many of them. The relative number of constituent leucocytes, specific gravity, and hemoglobin content of the blood sugar and urobilinogen contents in the urine were measured in five subjects who had both subjective symptoms and defective blood counts just before, one week after, and at the end of the intravenous administration of thioctic acid of 25 mg/day for 2 weeks. During these 2 weeks, a marked increase of the red and white cell counts, specific gravity of the whole blood, and hemoglobin contents as well as a marked decrease of urobilinogen excretion in the urine was noted but there was no improvement of the relative counts of the leucocytes. (Author summary modified)

06663

A. P. Rusinova

BENZENE AND ITS HOMOLOGUES AS POISONS IN ELECTRICAL WINDING AND INSULATION PLANTS . U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, Vol. 7, 176-81, 1962. (Gigiena Truda i Prof. Zabolevaniya) 1, (1) 20-4, 1957 Translated from Russian. CFSTI: 62-11103

The air of winding and insulation department of the plant investigated contained benzene and its homologues in concentrations exceeding the allowable limits. Most unfavorable operations were: application of adhesives to micanite on tables manually and their loading into the drying ovens; insulation and lacquering of windings; brush coating of pole coils; and finally, washing and cleaning various finished products. Unsatisfactory labor conditions produced occupational poisoning with aromatic hydrocarbons among the women workers, with symptons of typical blood picture changes and nervous system disturbances. A state of susceptibility occurred to some common non-occupational dis- eases, as was shown by increase in the morbidity of such diseases in woman with toxic symptoms as compared with the control women.

36820

G. F. Smith

TRICHLORETHYLENE: A REVIEW. Brit. J. Ind. Med. (London) 23 (4), 249-62 (Oct. 1966).

The physical and chemical characteristics of trichlorethylene are reviewed in relation to its uses in industry and medical practice with special attention being paid to its metabolism, toxicity, and determination in air. Although the acute toxicity of trichlorethylene was recognized soon after it came into widespread industrial use chiefly by its effects on the central nervous system, the recognition of a possible chronic toxic effect characterized by a mild psycho-organic syndrome came much later and is still not universally accepted. The opinion that trichlorethylene is non-toxic has long since been abandoned in view of the increasing evidence to the contrary. The preponderance of opinion is against any serious toxic effect on the liver, although individual cases of liver damage in industrial workers have been reported. The sudden fatal collapse of young workers during mild exercise has been reported on rare occasions which generally involved heavy exposure. The most common method of determination involves the use of gas detector tubes. The other chemical and physical methods of determination are discussed. The maximum permissible levels for trichlorethylene in air were reduced from 400 ppm in 1947 to 200 ppm, and to 100 ppm in 1961. Effects on the hemopoietic system are rare as are reports on renal damage. Air concentration as well as urinary metabolite levels are considered the best means of monitoring working conditions.

07740

Hansan, J., S. Hernberg, P. Metsala, and V. Vihko

ENHANCED POTASSIUM LOSS IN BLOOD CELLS FROM MEN EXPOSED TO LEAD. Arch. Environ. Health, 14(2):309-312, Feb. 1967. 24 refs.

The possibility that lead ions in vivo would interfere with the erythrocyte membrane functions suggested a study of some properties of the RBC of men exposed occupationally to inorganic lead. Blood samples were collected from seven shipyard workers exposed to lead oxide paint and from seven nonexposed control subjects. No signs or symptoms of lead poisoning could be detected in the exposed men, and the concentration of lead in their blood did not exceed 0.07 mg/100 ml. During incubation in a heparinized glass tube at 37 C for two hours, the concentration of potassium in the plasma of blood samples from the control group consistently decreased by 0.19 to 0.62 mEq/liter; it decreased in the blood sample of one exposed worker by 0.17 mEq/liter. In the blood samples of seven of the exposed workers, the concentration of potassium, under identical conditions, increased by 0.34 to 1.38 mEq/liter. No differences could be demonstrated between the mean potassium concentrations in the red cell samples from the two groups. Essentially similar results were obtained in samples from seven control subjects and seven of the same eight exposed workers after an interval of four months. No systematic differences were observed between the changes in sodium concentration in the blood samples from exposed and nonexposed workers. The results are interpreted as reflecting a deficiency in the functional capacity of erythrocytes of men exposed to inorganic lead, revealed by the load imposed on the cells by the incubation in vitro.

09727

Rasche, B., and W. T. Ulmer

CELLULAR RETENTION AND CELLULAR TRANSPORT OF INHALED DUST PARTI- CLES IN ALVEOLAR MACROPHAGES. ((Die zellulaere Rentention und der zellulaere Transport inhalierter Staubpartikel in Alveolarmakrophagen.)) Text in German. Med. Thorac. (Basel), 24(4): 227-236, 1967. 19 refs.

The alveoli are constantly traversed by free mononuclear cells, the macrophages, which may be significantly increased in number as a result of the inhalation of various irritants, including dust. After repeated inhalation of ultramarine blue paint dust particles (1-2 micron), guinea pigs had higher phagocyte indices than after a single inhalation. Phagocytized paint particles were also carried from the lungs to peritoneal organs in response to prior intraperitoneal irritation. As a result, fewer macrophages re- mained available to purify the lungs.

11359

V.A. Chizhikov

BIOLOGICAL EFFECT AND HYGIENIC SIGNIFICANCE OF LOW TOLUYLENE DIISOCYANATE CONCENTRATIONS IN THE ATMOSPHERE. In: Maximum Permissible Concentrations of atmospheric Pollutants, Book 8, V. A. Ryazanov and M. S. Gol'dberg (eds.), Translated from Russian by B. S. Levine, U.S. S. R. Literature on Air Pollution and Related Occupational Diseases, Vol. 15, pp. 12-24, 1968. ((34)) refs. CFSTI: PB 179140

The threshold of toluylene diisocyanate odor perception for most odor sensitive persons was established at 0.2 mg/cu m; 0.15 mg /cu m was the maximal nonodor-perceptible concentration of toluylene diisocyanate vapor. The threshold effect of toluylene diisocyanate on electric brain activity was established at 0.10 mg/cu m; 0.05 mg/cu m of the vapor elicited no changes in the electrical brain activity. It is proposed that 0.05 mg/cu m of toluylene diisocyanate be adopted as the maximal single limit of allowable concentration in the atmospheric air. Exposure of white rats to the inhalation of air containing 2 and 0.2 mg/cu m of toluylene diisocyanate 24 hours a day for 84 days elicited in the experimental rats an arrest in their weight gain, enhanced cholinesterase activity, affected their motor chronaxy, elicited a change in the protein fraction ratios, and affected porphyrin metabolism. No changes in any of the above mentioned phases could be detected in white rats exposed to the chronic inhalation of 0.02 mg/cu m of toluylene diisocyanate. It is proposed that the average 24 hour limit of allowable toluylene diisocyanate concentration in the atmospheric air be set at the level of 0.02 mg/cu m.

27132

Hartogensis, F. and R. L. Zielhuis

HEALTH STANDARDS FOR LEAD CHROMATE DUST. Ann. Occupational Hyg., vol. 5:27-36, 1962. 18 refs.

Ratios of lead to chromium are reported for those departments of pigment industries where chrome yellow is exclusively produced and processed. They indicate that a large proportion of the lead intake of exposed workers is lead chromate. Data for 26 workers show a consistent decrease of haemoglobin and increase of coproporphyrinuria and basophilia with increasing exposure to lead chromate dust. These results suggest that lead chromate dust is as toxic as more soluble lead compounds and that the maximum allowable concentration should be the same as for other lead compounds (0.1 or 0.2 mg Pb/cu m). The toxicity of lead chromate in paints may be lower than its toxicity in pigments because in the paints the pigment particles are coated with a vehicle, rendering it difficult for the organism to attack and absorb small paint droplets.

28814

Biersteker, K.

AIR POLLUTION AND MORTALITY IN ROTTERDAM. (De medische betekenis van de luchtverontreiniging in Rotterdam). Text in Dutch. Jaarboek Kankeronderzoek Kankerbestrijding Nederland, no. 15:183- 195, 1965. 6 refs.

Air pollution in general and in particular the presence of carcinogenic compounds are a public health problem. Although there was not an increase in total daily mortality during the past seven years on days of severe air pollution in Rotterdam, there was a positive fluctuation in the number of deaths from cardiorespiratory diseases and tumors in December 1962 and January 1959. However, the presence of more sulfur dioxide indoors than outdoors in some Rotterdam homes makes one uncertain as to whether this correlation is causal to indoor or outdoor concentrations. Death rates from chronic bronchitis in Rotterdam were compared to those for 4 agricultural communities. While the chronic bronchitis mortality was stationary in the 4 provinces, Rotterdam males showed a 100% increase in death rate since 1950. An analysis of occupations revealed a possible promoting influence of the following occupations on lung cancer risk: metalworker, painter, and driver. However, occupation alone explains only a very small part of the total male lung cancer mortality in Rotterdam. Smoking habits also have not explained a higher lung cancer mortality nor has air pollution definitely been concluded to account for this prevalence of lung cancer. (Author summary modified)

29963

PROCEEDINGS OF THE 9TH CONFERENCE OF JAPAN ASSOCIATION OF INDUSTRIAL HEALTH. (Dai 9 kai Nippon sangyoi kyogikai kiji). Text in Japanese. Sangyo Igaku (J. Ind. Health), 13(2):138-159, March 1971.

Brief summaries are given of conference reports on medical examinations of workers handling heavy metals, especially lead; case histories of lead poisoning in paint factories; health control at beryllium factories; and a case of an oxygen-deficient environment. Also summarized are reports on the effect of auto exhaust on patrols, results of medical check-ups on taxi drivers and toll collectors, and the hygienics of airborne lead particles.

33504

Battigelli, M. C.

MERCURY TOXICITY FROM INDUSTRIAL EXPOSURE. A CRITICAL REVIEW OF THE LITERATURE - PART I. J. Occupational Med., vol. 2:337-344, July 1960. 67 refs.

Data from animal experiments and observations of human cases are analyzed in relation to the variables of intake and subsequent handling by the body of mercury in different forms. Industrial exposures include the mining and refining of ore containing cinnabar (mercurous sulfide); the manufacture of felt hats, technical instruments, carbon brushes for electrical equipment, and certain fluorescent lamps; and the use of mercury paints. The degree of intoxication produced by mercury is determined by the amount and rate of absorption, physiochemical properties of the absorbed compound, and individual susceptibility. Neither the amount of mercury that constitutes a harmful total body burden nor the amount that is safely tolerated is known with satisfactory precision for humans. The metabolism of mercury in the blood, brain, kidney, liver, and intestine is discussed. It is known that mercury develops chemical associations with various substances in the blood. There is a poor correlation between the amount of mercury localized in a given tissue and pathological changes. The matter is further complicated by the fact that mercury may be found in impressive concentrations in the tissues of persons with no identifiable intake of this substance. The diuretic effect of mercurials stems from their inhibition of succinic dehydrogenase within kidney cells. The ultimate effect of mercury and its compounds is very probably based on the capacity of these substances to inhibit enzymes.

44874

Gerarde, Horace W.

TOXICOLOGICAL STUDIES ON HYDROCARBONS: III. THE BIOCHEMORPHOLOGY OF THE PHENYLALKANES AND PHENYLALKENES. Arch. Ind. Health, 19(4) 403-418, April 1959. 11 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 18th, St. Louis, Mo., April 1957 and at the American Industrial Hygiene Association, Annual Meeting, 19th, Atlantic City, N. J., April 1958.)

The present state of knowledge regarding the toxicology, biochemistry, and metabolism of the alkyl derivatives of benzene is presented. Toluene and the xylenes are obtained by distillation of coal tar and from petroleum. Alkylbenzenes are used as constituents of aviation and automotive gasoline; as starting materials in the synthesis of plastics, paints, and pesticides; and as solvents for paints, dyes, inks, and lacquers. In general, lengthening of the side-chain diminishes the odor of the compound since the vapor pressure decreases with increasing molecular weight. The liquid alkylbenzenes, on contact with mucous membranes, cause local irritation and vasodilatation. This property diminishes in potency with the lengthening of the alkyl substituent and multiplicity of alkyl groups. Branching and unsaturation of the chain increase the local irritation potency. Direct contact of the liquid alkylbenzenes with pulmonary tissue causes chemical pneumonitis characterized by pulmonary edema, hemorrhage, and tissue necrosis. Direct contact by these hydrocarbons causes vasodilatation, erythema, and irritation; branching tends to increase the potency for local irritation. In industry the alkylbenzenes are absorbed into the blood through inhalation and percutaneous absorption. They accumulate in tissues having a high lipid content. Local irritation of endothelial cells by the hydrocarbons results in permeability changes in the capillaries. This leads to increased diapedesis, edema in surrounding tissues, petechial and gross hemorrhage. The branched and unsaturated chain alkylbenzenes are more irritating than the corresponding unbranched and saturated alkylbenzene isomers. The alkylbenzenes have a particular affinity for nerve tissue because of its high lipid content. The presence of these hydrocarbons in the brain cells interferes with normal metabolic processes, resulting in sluggishness, stupor, anesthesia, and coma. This is in sharp contrast with benzene, which is a neuroconvulsant producing stimulation characterized by tremors and convulsions. Benzene is also considered a dangerous chemical due to its destruction of blood-forming tissue. Because it is less irritating than the alkyl derivatives, systemic injury on repeated exposure can occur at air concentrations below levels which warn of its presence.

I. EFFECTS-MATERIALS

05233

P. J. Hearst

VOLATILE PHOTODEGRADATION PRODUCTS OF ORGANIC COATINGS. Naval Civil Engineering Lab., Port Hueneme, Calif. July 1966. 36 pp. (Technical Rept. (No. R 460.)

Various clear and pigmented vehicle films were irradiated in air with a mercury arc and a xenon arc. The volatile photodegradation products were identified by infrared spectroscopy. The coatings included alkyd, oil, vinyl-alkyd, vinyl copolymer, partially hydrolyzed vinyl copolymer, polyvinyl acetate, epoxy-amine, and epoxy-polyamide films. The major product from all films was carbon dioxide. Eleven other products or types of products were obtained, as well as some unidentified products. The addition of pigments decreased the yields of almost all the products. However, the yields of different products were affected in different degrees by pigmentation, and this difference may in part be related to the penetration of the light responsible for the production of each particular product. (Author abstract)

23551

Donovan, P. D. and J. Stringer

CORROSION OF METALS BY ACID VAPOURS. Royal Armament Research and Development Establishment, Fort Halstead (England), Basic Techniques Div., M-5/70, 10p., March 1970. CFSTI, DDC: AD 703572

Organic acid vapors may be evolved in trace quantities from a wide variety of organic materials. If such sources are held in confined spaces with metals, significant levels of vapors build up which, at high humidities, may cause rapid corrosion. Based on a simple test developed for vapor corrosion, the sources of organic acid vapors encountered viz. woods, fabrics, paints, adhesives, and certain plastics are discussed and the types of vapors evolved from many of these are identified. Methods of reducing the quantities of acids evolved are considered. The action of a wide range of concentrations of acetic and formic acids on a variety of metals is reported. Zinc and cadmium, the metals most frequently used as protective coatings, are among the most susceptible to this form of attack; steel, magnesium, and lead are also rapidly corroded. Copper, brass, and nickel are less rapidly attacked and tin, aluminium, and silver are resistant. A wide range of alloy electrodeposits was studied for their susceptibility to this type of corrosion; the most protective coatings for steel against atmospheric and vapor corrosion effects were nickel/zinc, tin/cadmium, manganese/selenium, and a duplex coating of tin over cadmium. The practical implications, particularly in packaging, are considered. (Author summary modified).

44509

Spence, J. W. and F. H. Haynie

PAINT TECHNOLOGY AND AIR POLLUTION: A SURVEY AND ECONOMIC ASSESSMENT. Environmental Protection Agency, Research Triangle Park, N. C., National Environmental Research Center, Office of Air Programs Pub. AP-103, 44p., Feb. 1972. 65 refs. NTIS: PB210736

Technical developments within the paint industry with application to characteristics of pollutant attacks on exterior paints were surveyed. The specific effects of hydrogen sulfide, sulfur dioxide, ozone, and particulates on exterior finishes were considered. Hydrogen sulfide attacks in-service exterior house paints, causing discolorations and darkening. Sulfur dioxide attacks result in film deterioration and can increase the drying and hardening times of certain paint systems. Agglomeration of particulates causes loss of aesthetic attractiveness and chemical degradation of film. Chemical damage to four classes of exterior paints, i. e., household, automotive refinishing, coil coating, and maintenance, was assessed for economic losses. The total estimated cost at the consumer level is over $0.7 billion/yr. Household paint sustains the most damage, representing over 75% of the total dollar loss. (Author abstract modified)

J. EFFECTS-ECONOMIC

30696

LeSourd, D. A., M. E. Fogel, A. R. Schleicher, T. E. Bingham, R. W. Gerstle, E. L. Hill, and F. A. Ayer

COMPREHENSIVE STUDY OF SPECIFIED AIR POLLUTION SOURCES TO ASSESS THE ECONOMIC EFFECTS OF AIR QUALITY STANDARDS. VOL. I. (FINAL REPORT).

Research Triangle Inst., Durham, N. C., Operations Research and Economics Div., APCO Contract CPA 70-60, RTI Proj. OU-534, Rept. FR-OU-534, 395p., Dec. 1970. 328 refs. NTIS: PB 197647

Air pollution control costs for mobile sources are presented on a national basis and in terms of unit investment and annual operating and maintenance costs as well as total annual operating and maintenance costs. The analyses cover the estimated emissions and control costs for new cars for Fiscal Year 1967 through Fiscal Year 1976. Control costs for each stationary source, except for residential heating, are shown for 298 metropolitan areas by investment and annual expenditures by Fiscal Year 1976. The impact of control on selected industries and the Nation are also determined. Finally, an extensive bibliography is included. The pollutants from mobile sources selected for analysis are hydrocarbons, carbon monoxide, nitrogen oxides and particulates. The six pollutants for which control cost estimates are made for stationary sources are particulates, sulfur oxides, carbon monoxide, hydrocarbons, fluorides, and lead. Emission standards applied are considered stringent in comparison with many currently in use throughout the Nation. Mobile sources include automobiles and light and heavy-duty trucks. Stationary sources studied include solid waste disposal, commercial and institutional heating plants, industrial boilers, residential heating plants, steam- electric power plants, asphalt batching, brick and tile, coal cleaning, cement, elemental phosphorus, grain handling and milling (animal feed), gray iron, iron and steel, kraft (sulfate) pulp, lime, petroleum products and storage, petroleum refineries, phosphate fertilizer, primary non-ferrous metallurgy (aluminum, copper, lead and zinc), rubber (tires), secondary non-ferrous metallurgy, sulfuric acid, and varnish. Data essential for defining metropolitan areas, emission control standards, and relevant process and air pollution control engineering characteristics required to support the cost analyses for each source and the cost impact on each industrial process are presented and analyzed in separate appendixes to this report. (Author abstract modified)

K. STANDARDS AND CRITERIA

00250

L. C. McCabe and J. S. Lagarias

AIR POLLUTION AND THE PAINT INDUSTRY. J. Paint Technol., 38(495):210-216, Apr. 1966. (Presented at the 43rd Annual Meeting, Federation of Societies for Paint Technology, At- lantic City, N. J., Oct. 29, 1965.

The manner in which regulations on gaseous and particulate emissions affect the paint industry is reviewed with special emphasis on proposed new legislation concerning solvent emissions. Factors which influence the establishment of emission standards and ambient air quality are discussed. The inconsistencies from community to community on emission standards do not appear to be related to meteorological or local conditions. It is suggested that the setting of standards for air quality should depend upon establishing the effects of air pollutants on humans, animals, and vegetation as well as economic and meteorological considerations. A review of existing codes shows that this has not always been done. In the case of organic solvents, proposed legislation could result in substantial changes in the use of certain solvents.

L. LEGAL AND ADMINISTRATIVE

05106

G. W. Fiero

PROTECTIVE COATINGS AND RULE 66. Am. Paint J. 52 (29), 70-1. 74, 76, 78, 80, 82 (Jan. 9, 1967).

Rule 66 defines 'photochemically reactive' solvents as those containing more than 20 per cent total of the substances listed or more than: (1) 5 percent olefinic or cyclo-olefinic hydrocarbons, alcohols, aldehydes, esters, ethers or ketones. (2) 8 percent c8 or higher aromatics except ethylbenzene. (3) 20 per cent ethylbenzene, toluene, branched ketones or trichloroethylene. Rule 66 requires reduction of 85 per cent of emissions of solvents from various industrial applications if 'photochemically reactive' solvents are used. There are some uncertainties with regard to the rule. For example, both state and federal protective coatings specifications in many cases specify the solvents employed and often they are the 'photoreactive' variety. To make matters worse, Presidential Orders require Federal facilities to abide by local air pollution regulations. After many consultations with industry, in March and April 1966 LA APCD, in conjunction with California Manufacturers Assn., conducted a series of tests on solvents and Rule 66 was finalized. The reason for this rule was that an estimated 345 tons of solvents were emitted each day in 1965 from the drying of protective coatings. After the final Rule 66 was adopted, the Bay Area APCD followed suit and in its current draft it prohibits the sale or use of quart or larger sizes of building coatings containing more than 8 per cent 'reactive organic compounds' plus 12 per cent of monosubstituted aromatics. Industrial coatings are limited to 20 per cent of 'reactive organic compounds.' Thus, in the current draft, Bay Area APCD regulations are somewhat less restrictive than LA APCD Rule 66, but the number of pounds exempt per facility is less than LA. The Bay Area APCD estimates 1964 emission of solvents to be 297 T/D of solvents. Industry is compiling data for a more up-to-date figure. It should be borne in mind that this is a draft; final Regulation 3 is expected to issue in January of 1967 to become effective January 1, 1968.

05471

J. Oliver

THE PAINT FINISHER AND AIR POLLUTION. Prod. Finishing (Cincinnati) pp. 62-9. Apr. 1967.

Rule 66 adopted by Los Angeles County, July 28, 1966 requiring tighter control of the 550 tons of solvent vapor discharged daily appears to be a precursor of regulatory action in other areas. The rule was based on smog chamber tests of the photochemical reactivity of various solvent vapors. Rule 66 prohibits the discharge of more than 15 pounds of organic material into the atmosphere daily from heat-cured, baked, or heat-polymerized material unless all organic material has been reduced 85% or to not more than 15 pounds daily. With air-drying finishes containing no photochemically reactive solvents there are no restrictions. Control measures include a greater use of water - based coatings and the substitution of a mixture of oxygenated solvents and aliphatic hydrocarbons for aromatic solvents. Where formulation changes do not control the exhausts from spray booths or baking ovens, alternative controls include absorption, liquid scrubbing, incineration, and catalytic combustion. Substantial tax benefits are under consideration in some states for companies installing pollution-abatement equipment.

06486

B. F. Postman

AIR POLLUTION CONTROL IN THE CITY OF NEW YORK. Am. Ind. Hyg. Assoc. J. 26 (4), 394-9 (Aug. 1965). (Presented at the 25th Annual Meeting, American Industrial Hygiene Association, Philadelphia, Pa., Apr. 30, 1964.)

The Department of Air Pollution Control of New York City is discussed with special emphasis on approaches and specific control problems. The present Department of Air Pollution Control was authorized by law in November 1952. The Department is responsible not only for smoke control and abatement but also for the control of all sources of air pollution. During the 11 years of operation, the Department has developed criteria for oil-fired equipment, flue-fed and direct-fed incinerators; criteria for spray booths, drying ovens, and spreaders, including all types of coating and impregnating operations; and criteria used in the examination of applications for registration of retail neighborhood dry-cleaning establishments including coin-operated dry-cleaning establishments. Technical data sheets relative to required data for review of submitted applications have been developed.

07187

E. C. Larson and H. E. Sipple

LOS ANGELES RULE 66 AND EXEMPT SOLVENTS. J. Paint Technol. 39(508):258-264 (May 1967). (Presented at the Los Angeles Society for Coatings Technology, Calif., Oct. 12, 1966; at the Golden Gate Society, San Francisco, Calif., Oct. 17, 1966; and at the Portland, Seattle, abd Vancouver Sections of the Pacific Northwest Society, Washington, Oct. 19, 20, and 21, 1966.)

The implications of Rule 66 of the Los Angeles County Air Pollution Control District, which controls the emissions of volatile organic solvents, are reviewed for their effect on the paint industry. The various provisions of Rule 66 are discussed to illustrate the desirability of using exempt solvents. Saturated hydrocarbons (iso, normal, and cycloparaffins), alcohols, esters, ether-alcohols, and non-branched ketones are entirely exempt. The exempt limits for photochemical reactive materials are as follows: olefins - 5%, C8 plus aromatics - 8%, and toluene, ethylbenzene, branched ketones, and trichloroethylene - 20%. With mixtures of these photochemical reactives the total allowable amount is 20%. The problem facing the paint industry is the replacement of the aromatic solvents which are good solvents, but are photochemically reactive. (igh solvency napthenic base stocks will help offset the solvency of the displaced aromatics for the long oil alkyds and many medium oil alkyds. Small quantities of non-exempt solvents can be used provided the escaping vapors are condensed or burned efficiently. The General Services Administration has asked for a revision of all their purchasing specifications to conform to Rule 66.

07483

Maher, G. R.

AIR POLLUTION REGULATION OF NONVEHICULAR, ORGANIC-SOLVENT EMISSIONS BY LOS ANGELES RULE 66. J. Am. Oil Chemists Soc. 44(8):340A, Aug. 1967. (Presented at the AOCS Short Course, East Lansing, Mich., Aug. 29-Sept. 1, 1966.)

In an effort to control sources emitting organic solvents into the atmosphere, the Air Pollution Control District of Los Angeles County, Calif., successfully secured passage of Rule 66 into law. Rule 66 specifically relates to the control of organic solvent emissions from stationary sources. The major contributor to the 550-ton daily emission of organic solvents was industrial, commercial, and residential painting. Organic solvent-containing products are to be controlled as follows. 1. A maximum of 5% by volume of olefinic or cycloolefinic organic solvents may be present. 2. A maximum of 8% by volume of aromatic organic solvents having eight or more carbon atmos may be used. 3. Ketone organic solvents having a branched chain structure, such as methyl iso-butyl ketone, are limited to a maximum of 20% by volume. 4. A maximum of 20% by volume of toluene may be used. 5. Ethylbenzene, an aromatic organic solvent with eight carbon atmos, was given a special status and allowed a maximum of 20% by volume. 6. Trichloroethylene is restricted to a maximum of 20% by volume.

08055

Hardison, L. C.

CONTROLLING COMBUSTIBLE EMISSIONS. Paint Varnish Prod., 57(7):41- 47, July 1967.

The control of solvent emissions may be handled by adsorption, thermal incineration, and catalytic incineration. Adsorption has the disadvantage of requiring reconstitution of the solvent and presents a complex addition to the manufacturing procedure. Adsorption as a means of concentrating solvent into a smaller stream for subsequent incineration appears attractive for some paint spray applications. Incineration provides the most nearly universal answer to the solvent emission problem, and perhaps the most costly. Catalytic incineration is not universally accepted at the present time because of the lack of evidence of sustained performance, and will require a guarantee of service and replacement in order to gain acceptance for solvent emission control. Thermal incineration, on the other hand, can be assumed to sustain a given performance level if the flows, temperatures, etc., are held constant. This will be the main tool for solvent incineration in the coating industries in the near future.

08376

Fiero, George W.

SOLVENTS, SMOG AND RULE 66. J. Am. Soc. Lubrication Engr., 23(11):448-458, Nov. 1967. 29 refs. (Presented at the 22nd ASLE Annual Meeting, Toronto, Canada, May 1-4, 1967.)

Solvents and cleaners evaporate into the air and some of them may become pollutants. Their quantity, however, is relatively small and their photochemical reactivity is relatively low. Since, however, certain solvents when tested in smog chambers at relatively hihg concentration (4ppm) do produce eye irritating products their use is restricted in Los Angeles by Rule 66 and in the San Francisco Bay area by Regulation 3. These are discussed in detail. The topographical and meteorological characteristics of these locations are unique. Therefore, such restrictions should not be imposed in other localities until a thorough study is made to determine the extent, if any, which solvents may contribute to smog.

08826

THE AMERICAN PAINT CONVENTION: AIR POLLUTION AND RULE 66 DISCUSSED. Paint, Oil Colour J. (London), 152(3605):908-912, Nov. 17, 1967. 35 refs.

The discussion of the panel on air pollution at the annual meeting of the Federation of Societies for Paint Technology is reported. The panel consisted of four speakers and a chairman, or moderator, drawn from various parts of industry, and including raw material and equipment manufacturers. The history of the recent legislative proceedings, a review of other local rules and by-laws, problems of reformation and elimination of air-polluting products were discussed by the panel. Rule 66, which was implemented on July 1, 1967, was the final result of prolonged work and followed the drafting of 65 intermediate regulations, some of which threatened the very existence of many industries in Los Angeles. The complicated nature of Rule 66 was made apparent from the numerous printed commentaries in the form of questions and answers. Reverting to methods of control and disposal of excessive air pollution emission as discussed by the panel, three major sources of air-pollution in the manufacture of paint and ancillary products and their use were considered, namely: (1) Resin manufacture; (2) Paint application and drying; and (3) Paint baking. The panel did not concern itself with details of reformulation, otherwise than to indicate the basic problems facing formulations.

09612

Peters, Alec Peters, Alec

AIR POLLUTION LEGISLATION IN THE UNITED STATES. Preprint, Franklin Inst. Research Labs., Philadelphia, Pa. Science Information Services, 20p., 1968. 15 refs. (Presented at the International Symposium on Powder Coatings, London, England, Feb. 13-15, 1968.)

The recent enactment of Rule 66 in Los Angeles, which regulates the emission of hydrocarbon solvents, has now focused attention on the air pollution problems of the coatings industry in the United States, and affects both the manufacturers and users of coatings. The implications and effects of this law, as well as the overall American scene with regard to air pollution control are discussed.

09918

Los Angeles County Air Pollution Control District, Calif.

INFORMATION CONCERNING PROPOSED RULES 66, 66.1,and 66.2. CONTROL OF ORGANIC SOLVENTS. Preprint, ((17))p., June 15, 1966.

Questions and answer are presented which may help in explaining the provisions of proposed Rules 66, 66.1 and 66.2 concerning the control of organic solvents. Fifty-one questions and answers are included Proposed rules 66.1 on architectural coatings and 66.2 on disposal and evaporation of solvents are presented.

10083

Fiero, George W.

AIR POLLUTION AND PROTECTIVE COATINGS: HOUSTON, DALLAS, AND WASH- INGTON. J. Paint Technol., 40(520):222-228, May 1968. 18 refs.

In general, man-made air pollutants are largely products of combustion, and solvents from protective coatings are not major air pollutants. Photochemical smog prevalent in Los Angeles results fro inter-reaction between oxides of nitrogen, reactive hydrocarbons, a oxygen. Hydrocarbons vary greatly in their reactivity; hydrocarbo found in solvents are less reactive than auto exhaust. Data are provided on common air pollutants in Houston, Dallas, Ft. Worth, an Washington. Rule 66 and its definition of photochemically reactive solvents are examined with respect to the use of protective coating in the San Francisco Bay Area. Where federal specifications apply, the Bay Area Air Pollution Control District has agreed to draw up a variance to January 24, 1969. So far, Rule 66-type regulations hav not been adopted anywhere other than California. The New York, New Jersey and Pennsylvania regulations and proposed rules are discusse Industry must cooperate with local authorities to reduce general a pollution. The National Paint, Varnish and Lacquer Association smo chamber at Batelle Memorial Institute should provide data relative the extent solvents add to photochemical smog.

11069

Feldstein M. and W. R. Crouse

THE APPLICATION OF THE BAY AREA AIR POLLUTION CONTROL DISTRICT REGULATION 3 TO SOLVENT EMISSION CONTROL. Preprint, Bay Area Air Pollution Control District, San Francisco, Calif., ((8))p., 2 refs. 1968. (Presented at the 61st Annual Meeting of the Air Pollution Control Association, St. Paul, Minn., June 23-27, 1968, Paper 68-47.)

Regulation 3 of the Bay Area Air Pollution Control District controls the emission of reactive organic compounds only. The Regulation applies to other industrial sources than the surface coating and solvent operations, but remarks are confined to these latter industries. The Regulation defines reactive organic compounds, and suggests methods by which they can be measured in effluent gases or in solvents.

11074

Chass, R. L., Krenz, W. B., and Dickinson, J. E.

AN APPRAISAL OF RULE 66 OF THE LOS ANGELES COUNTY AIR POLLUTION CONTROL DISTRICT. Preprint, Los Angeles County Air Pollu- tion Control District, 22p., 1968. (Presented at the 61st Annual Meeting of the Air Pollution Control Association, St. Paul, Minn., June 23-27, 1968, Paper 68-46.)

Emissions of organic solvents to the atmosphere of Los Angeles County Air Pollution Control District (APCD) are currently estimated at 600 tons per day. In order to reduce these emissions Rule 66 was enacted on July 28, 1966, after more than a year of joint effort by industry and the APCD. The provisions of rules 66, 66.1, and 66.2 are explained as well as how their enforcement will affect industry and the entire community, and discusses the methods being utilized by industry to bring its various operations into compliance. (Authors' abstract, modified)

11090

Scofield, Francis

THE PAINT INDUSTRY APPROACH TO SOLVENT EMISSION CONTROL. Preprint, National Paint, Varnish and Lacquer Assoc., 4p., 1968.

The National Paint, Varnish, and Lacquer Association established a smog chamber for the use of the paint industry, to be devoted entirely to solvents used in coatings. The chamber is currently operating and meaningful data are being collected. The objectives include: the determination of smog-forming tendencies of solvents which had not been previously examined, and which are not currently controlled; the examination of solvents currently controlled, as members of a class (such as branched-chain ketones) although no tests had been run on the specific compound; study of the products of baking ovens; and study of the smog-forming reaction, to relate structure to smog-forming tendency. Some policies, contributions, and positions of the association are also described.

12789

Lunche, Robert G., Walter J. Hamming, Warren M. Dorn, Louis J. Fuller, S. Smith Griswold, H. E. Sipple, Q. H. Coffman, J. G. Hayes, W. J. Ryan, Rae E. Houke, J. C. George, and G. R. Morris

L. A. S RULE 66 NIPS AIR POLLUTION DUE TO SOLVENTS. SAE (Soc. Automot. Engrs.) J., 76(11):25-31, Nov. 1968. 11 refs.

Enacted in July 1966, Rule 66 of the Los Angeles County Air Pollution Control District struck at what had then become the last remaining uncontrolled major hydrocarbon contributor to photochemical smog -- the emission of reactive organic solvents into the atmosphere. Essentially, the rule prohibits the emission of more than 40 lbs per 24-hour day of these photochemically reactive organic solvents into the atmosphere from any piece of equipment where coatings are being applied or dried unless a suitable air pollution control device is employed. Other features of the rule are described, as well as industry compliance, search for a substitute instead of investment in control equipment, and development of a non-photochemically reactive solvent. A full-scale environmental test chamber study was conducted in 1962-63 by the District to determine the photochemical reactivity of various solvents, in which eye irritation and ozone formation were the criteria utilized to judge relative reactivity. Solvent chemistry is reviewed.

20530

McFadden, Vincent D.

AIR POLLUTION AND FINISHING. Ind. Finishing (Indianapolis), 43(9):28-30,32,34, Aug. 1967.

Studies conducted in Los Angeles, using a smog chamber, revealed that organic solvents of the type used in coatings are the cause of about 20% of the total organic emissions. Rule 66, which was consequently enacted, is considered in its application to industrial finishings. Coatings baked, heat cured or heat polymerized, regardless of the type of solvent used, are limited to no more than 15 lbs per day from each operating setup, and air-dried coatings in which photochemically reactive solvents are used are limited to 40 lbs per day. Some of the following more common solvents are restricted: xylene, toluene, MIBK, DIBK, mineral spirits, ethyl amyl ketone, Solvesso 100, and hi-flash naphtha. Regulation No. 3 in San Francisco basically follows the form of Rule 66, but it tolerates more solvents; suppliers shipping quantities of photochemically reactive agents in the Bay Area in 55-gallon containers or larger must register this delivery with the San Francisco Air Pollution Control District.

25176

Joyce, James D.

AIR POLLUTION: HOW IS THE FINISHER INVOLVED? Prod. Finishing, 35(3):70-83, Dec. 1970. 4 refs.

Recent and future developments in air pollution legislation are discussed with reference to their implications for the solvents-consuming industry. The framework used by the Federal government to control air quality is given in the Clean Air Act of 1963 and the Air Quality Act of 1967. This legislation gives the Department of Health, Education and Welfare the authority to establish air quality regions, to issue air quality criteria for pollutants, and to make available state-of-the-art emission control techniques. Of particular interest to the finisher are the criteria on photochemical oxidants and hydrocarbons, and the corresponding documents discussing their control techniques for their emissions from stationary and mobile sources. The criteria for photochemical oxidants point out that the lowest level of photochemical reaction by-products observed to affect human health correspond to a nonmethane hydrocarbon content of about 130 micrograms/cu m. Therefore, state authorities can be expected to restrict levels of total nonmethane hydrocarbons. This approach differs from that taken by the Los Angeles County Air Pollution Control District, which rigidly controls the composition of hydrocarbons emitted to the atmosphere. A report of the National Paint, Varnish and Lacquer Association tends to confirm data on smog- producing solvents used to derive the Los Angeles regulation. While the uncertain nature of future legislation makes it difficult for the finisher to plan for the future, he should become familiar with methods of controlling solvent vapor emissions, including those from vapor degreasers. These are to be found in the National Air Pollution Control Administration's booklet 'Control Techniques for Hydrocarbon and Organic Solvent Emissions from Stationary Sources.'

25592

Polglase, William L.

THE CONTROL OF ORGANIC SOLVENTS. Preprint, Ohio Painting and Decorating Contractors Association, 9p., 1970. (Presented at the State of Ohio Painting and Decorating Contractors Association Convention, Nov. 5-7, 1970.)

When engineering studies in the Los Angeles area indicated that that organic emissions from solvent usage were second only to those from gasoline-powered vehicles, a decision was made to regulate solvents classified as either reactive or moderately reactive. These are the solvents that enter into photochemical reactions in the atmosphere and produce smog. Provisions for their control are specified in Rule 66 of the Los Angeles Air Pollution Control District, which restricts emissions from paint bake ovens, heat curing, or heat polymerization in the presence of oxygen to 15 pounds a day. Emissions from all other operations using photochemically reactive solvents (such as paint spray booths and degreasers) are limited to 40 pounds a day. The use of architectural coatings containing reactive solvents is prohibited. Compliance with the regulations can be achieved through the use of afterburners or absorbers, use of solvents formulated from nonphotochemically reactive solvents, or process and equipment modification.

26070

Moffat, William E. G.

EUROPEAN LEGISLATION ON POLLUTION AND WASTE DISPOSAL. Paint Mfr., 40(11):35-37, Nov. 1970. 1 ref.

European legislation and practice on water and air pollution and waste disposal are surveyed. The effects on the paint industry are highlighted. Water pollution control legislation is mentioned for Austria, Belgium, France, the Netherlands, Sweden, Switzerland, and the United Kingdom. Three classes of water are defined in Belgium, and Class 1 which pertains to drinking water has very strict standards of temperature, pH, solid content, and oxygen content. The other two classes which pertain to fishing waters and industrial water have wider limits. Control of air pollution throughout Europe is confined at present chiefly to limiting sulfur dioxide and exhaust fumes from motor cars. Regulations regarding air pollution from paint manufacturing are mentioned in particular for West Germany. Solid waste from the paint industry includes such materials as paper, packaging materials, processing, and cleaning residues.

32075

Fogel, M. E., R. E. Folsom, E. L. Hill, and F. A. Ayer

SURVEY PLAN FOR SPECIFIED AIR POLLUTION SOURCES. (FINAL REPORT). (VOLUME III). Research Triangle Inst., Research Triangle Park, N. C., Operations Research and Economics Div., APCO Contract CPA-70-60, RTI Proj. OU-534, APTD-0664, 44p., Dec. 1970. 4 refs. NTIS: PB 198780

A survey plan intended to increase the statistical validity of future cost of clean air reports is presented. Eleven industrial sources are included in the sampling plan: asphalt batching, brick and tile, coal cleaning, grain milling (animal feed) and handling, lime, petroleum refining, petroleum storage, rubber (tires), secondary nonferrous metallurgy, sulfuric acid, and varnish. Air pollution control survey forms for the specified sources are included. Sampling design recommendations are presented for national, state, and metropolitan surveys. Recommendations for mail and follow-up procedures are discussed, and estimation techniques are presented. (Author abstract modified)

34501

A CORPORATE CONCERN FOR OUR ENVIRONMENT. PPG Products, 79(1):10-11, 1971.

At PPG, environmental control has emerged as a major administrative segment of corporate activity. The Environmental Control Policy Committee was established in 1969. Chaired by the vice president of corporate relations, it includes the manufacturing vice presidents of the company s four operating divisions. Company pollution control spending is projected at a minimum of $52.5 million for 1971-75. The Glass Division designed what it calls continuous air recording units to collect ambient air data in the area of its plants, while a PPG-designed noiseless and smokeless incinerator for liquid organic and aqueous wastes will solve a disposal problem at some of the company s Coatings and Resins Division facilities. An environmental control laboratory was recently established to serve all four divisions and PPG s subsidiaries.

43926

Hendry, A. L.

FLORIDA AIR AND WATER POLLUTION CONTROL ACT. J. Paint Technol., 43(559):78-79, Aug. 1971. (Presented at the Southern Society for Paint Technology, Annual Meeting, Atlanta, Ga., March 1971.)

The intent of the Florida Air and Water Pollution Control Act is to use the powers granted by the legislature to form state and local agencies for the prevention and control of pollution. Study of the Act and interviews with personnel showed that the agencies have broad and real power to compel compliance with the rules and regulations set up by these agencies. Appeals are provided for in the Act, but they are expensive and time- consuming. Coatings manufactures who have been contacted by the control agencies report the agencies to be fair and unbiased. There is no evidence that paint factories are regarded as pollution sources by the agencies themselves, but public concern over pollution should cause paint manufacturers to establish open and frank relations with the pollution control people in their areas. Good housekeeping procedures and a visible intent to comply with local pollution control rules will avoid unnecessary involvement with pollution control enforcement. (Author summary)

M. SOCIAL ASPECTS

00298

AIR POLLUTION PROBLEMS RELATING TO ORGANIC SOLVENTS. California Manufacturers Assoc. and Los Angeles County Air Pollution Control District, Calif., Nov. 4, 1965. 86 pp.

Preliminary to acceptance of a proposal to regulate the manufacturing and use of organic solvents in the Los Angeles Basin, a seminar wasconducted in order to elucidate constructive recommendations based on scientific analyses which would lead to an equitable law. The Seminar on Air Pollution served as a basis for general education in air pollution. Although general in Their Control; The Experimental Program on the Photochemical Activity of Organic Solvents; Control Equipment; Control of Organic Solvents from the Viewpoint of the Industrial Hygienist.

N. GENERAL

43824

Preuss, Harold P.

TECHNICAL DEVELOPMENTS IN 1971. PART 2. ORGANIC (PAINT) COATINGS, PROCESSES AND EQUIPMENT. Metal Finishing, 70(2):49-75, Feb. 1972 300 refs.

Literature concerning technical developments in the following areas is reviewed: resin developments (acrylic, nylon, silicone, urethanes, and vinyls); other raw material developments (additives, pigments, and solvents); surface preparation; coatings; protection against corrosion (mildew defacement); paint handling and application (coil coating, electrocoating, electron beam curing, powder coatings, and containers); paint removal, testing, and analysis; ecology; and health, safety, and the law (lead, mercury, air quality legislation, product labeling, and consumerism).

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